HUBER COAL BREAKER
(Ashley Breaker)
Glen Alden Coal Company
101 South Main Street
Ashley
Luzerne County
Pennsylvania

HAER No. PA-204

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PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

REDUCED COPIES OF MEASURED DRAWINGS

Historic American Engineering Record
National Park Service
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HISTORIC AMERICAN ENGINEERING RECORD

HUBER COAL BREAKER
(Ashley Breaker)

HAER No. PA-204

LOCATION:	Ashley, Luzerne County, Pennsylvania. 101 South Main Street.
DATE OF CONSTRUCTION:	Built 1938. Opened February 1, 1939. Technical changes made in the 1950s and in 1963.
ORIGINAL OWNER:	Glen Alden Coal Company
PRESENT OWNER:	Lucky Strike Coal Corporation
PRESENT USE:	None. Discontinued coal preparation operations in the mid-1970s.
SIGNIFICANCE:	The Huber Coal Breaker is important as an example of coal preparation plants built in the 1930s by large anthracite coal companies in Northeastern Pennsylvania to meet market conditions. The breaker was capable of preparing 7,000 tons of coal daily. It was among the first plants to treat all coal sizes separately with Menzies cones, which separated coal from refuse using circulating high pressure water at a rate of 8,000 gallons per minute. For refuse disposal, the first aerial disposal plants in the anthracite region were erected. Power was provided by a steam boiler plant, built in 1937, which generated the highest steam pressure and temperature of any colliery power house. Other outstanding features included: boom-delivered large coal to railroad cars eliminating the need for storage bins; the division of the breaker into two halves for separate or combined production; silos for fine coal used in the power plant; and the spraying of coal with a blue iridescent chemical.

PROJECT INFORMATION:

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INTRODUCTION

It was once described as "modern in both architectural design and operating details," a plant which combined "simplicity and efficiency" providing "a highly marketable output."[1] Today, as seen from Interstate 81, it resembles a decaying industrial "cathedral" looming over the village of Ashley, Pennsylvania. In its heyday, it processed over a million tons of coal in a year and was a bustling hub of railroad and truck traffic. Today, it stands abandoned with a faded sign meekly proclaiming "Home of Blue Coal", and its glass wall is riddled with open spaces created by recent machinery scavengers.

The structure is the Huber Breaker. It was erected by the Glen Alden Coal Company in Ashley, Pennsylvania, on the site of an old wooden breaker, the Maxwell. The new steel frame, glass sided plant, was designed consistent with the newest trends in industrial architecture with "majestic modernistic lines".[2] Named for C.F. Huber, the chairman of Glen Alden's board of directors, the breaker began operating on February 1, 1939 processing coal from the Huber colliery mines as well as several other of Glen Alden's mining operations in the Wyoming Valley. It was, at the time, the most modern of Glen Alden's breakers, and is an important example of coal preparation plants designed and built in the 1930s to centralize the processing of coal in a declining and changing market.[3]

The Huber Breaker could prepare 7,000 tons of anthracite coal daily. It featured the latest improvement in coal washing equipment, the Menzies cone, which separated coal from its impurities by using a circulating upward current of water at the rate of 8,200 gallons per minute (gpm).[4] Refuse, at a rate of 125 tons per hour, was carried out of the breaker by an aerial tramway, the first installed in the anthracite region. The power house, next to the breaker, produced 160,000 lbs. of steam-per-hour at a temperature of 632 degrees Fahrenheit, the highest in the anthracite fields.[5] Prepared coal from the breaker was hauled in railroad cars up the Ashley Planes, three double-tracked inclined planes, to the top of Wilkes-Barre mountain and then south to the metropolitan Atlantic coast markets on the Central Railroad of New Jersey lines.[6]

Adapting to continuing changes in the anthracite industry, Glen Alden initiated major remodeling projects for the Huber Breaker in the 1950s and again in 1963. Changes in the 1950s included a retail pocket for truck haulage.[7] In 1963, new coal preparation technology, including the first commercial installation of Wilmot Engineering Company's Dyna Whirlpool Process for separating coal from refuse, was introduced to prepare coal for the growing fine coal market.[8] However, by the mid-1970s the breaker was closed, a corporate giant was bankrupt, and the anthracite industry was doomed to virtual obscurity.

The Huber Breaker was a facility modern in architectural design, outfitted with the best available technology, operated and managed by the dominant anthracite producer in the region, connected to markets by sophisticated transportation systems, and adapted to changing industry and market circumstances throughout its history. Yet, it failed. As a result, a study of the Huber Breaker offers the historian an exceptional opportunity to examine the architecture, technology and operating processes of anthracite coal preparation within a given time frame, and some of the forces which led to the collapse of not only one industrial facility, but a corporation and a whole industry.

PRELIMINARY DEFINITIONS

Before proceeding with a history and description of the Huber Breaker's architecture, technology, and operating processes, it is necessary to define, at least preliminarily, several key components of the mining and preparation of anthracite coal. These components are: an anthracite colliery, an anthracite breaker, and the nature of anthracite coal when it comes from the mine.

An anthracite colliery is "the entire mining plant of an anthracite mine and includes both the surface improvements and the underground workings."[9] The underground mine workings at an individual colliery were often extensive; including several mines and several types (slopes or shafts) of mines stretching miles horizontally and sometimes over 1000' vertically. The description of anthracite underground operations is well documented,[10] and, since the focus of this report is on a surface structure, it will not be repeated here. The surface structures were designed to support the underground operations and prepare coal for shipment. A typical colliery might include a breaker, railroad tracks, boiler *houses, hoisting houses, ventilating fans, offices, powder houses, lamp houses, wash houses, and refuse dumps.[11] The arrangement of the structures was described in 1883 by H.M. Chance:

> In no feature do anthracite collieries differ from each other as much as in the arrangement of the plant above ground. This is due in part to generic differences in the structures that go into the make up of the plant, and in part to the topography of the surface on which these structures are erected, but principally because the mine superintendents and engineers throughout the region, apparently have not sufficiently appreciated the fundamental principles by which the best arrangements of all such plants should be determined....the various structures composing the plant seem to have been located at random, and with no view to the harmonious working of the whole as a unit.[12]

Yet, despite the appearance of randomness, the surface structures did operate in a harmonious fashion.

The central, dominant structure on the surface at an anthracite colliery from the 1850s on was the breaker. It was designed to facilitate the preparation of coal for shipment to market.[13] The term breaker was originally applied to the crushers or rollers used to break coal into small sizes. Eventually, however, the name breaker was given to the structure which housed not only rollers, but a wide variety of complex mechanical devices; including conveyors, shakers, picking tables, washers, elevators, and separators, which broke, washed, sized, removed impurities, and loaded the coal for shipment.[14] Breakers, initially constructed of wood, and later of steel, glass, and concrete, dominated the landscape of the anthracite region for over a century.

Breakers were a necessary part of anthracite mining because of the composition of coal as it comes out of the ground. Anthracite comes from mines in a variety of sizes, from huge lumps to fine powder, and is mixed with a multiplicity of impurities. Some of the impurities are classified as extraneous; that is, material composed of slate, bone, fireclay, rock, and veins of gypsum and calcite. These are removed quite easily in the cleaning process. Inherent matter is "material so finely disseminated and infixed in the coal that it cannot be separated by normal means."[15] As a result of its size variety and impurities, the mine-run coal[16] is not marketable, and must be processed to meet consumer expectations.[17] As the industry evolved, changing market conditions, particularly a demand for purer coal and coal of smaller sizes, meant the development of an increasingly complex preparation process, which, in turn, required more complex breakers.

BREAKER ARCHITECTURAL HISTORY AND DESCRIPTION

Since the Huber Breaker was described as "modern" and it was erected on the site of an "old" breaker, a description of breakers as they evolved throughout the history of anthracite mining must be considered to place Huber in some industrial and architectural framework.

EARLY BREAKERS

In the earliest days of mining, most coal preparation was done underground by miners who simply broke up the large lumps of coal and discarded the rock. This large coal was then transported directly to the market. As demand for a greater variety of sizes increased, however, some method for scattering the coal to remove impurities and to size the material became necessary.[18] Coal was spread out on platforms on the surface and broken by hand with sledgehammers. The refuse was swept aside and the coal pieces were pushed over perforated screens with different size holes to sort the coal. In the 1830s, the platforms were replaced by perforated cylinders which were turned by hand.[19] In the 1840s, simple sheds housing coal hoppers, rollers, and screens began to appear in the anthracite region. These were the first "breakers." The first one was erected at Wolf Creek colliery, near Minersville, Pennsylvania, in 1844. It used a system of rolls and screens for breaking and sizing coal developed by Joseph Batten of Philadelphia.[20]

The machinery Batten developed broke and screened coal at the same time. On cast-iron rollers with teeth, he constructed a hopper for the coal to pass from the rollers to a long screen hung in an inclined position. The coal passed through the rollers on to the screen made up of four or five sizes. On October 5, 1843, he received U.S. Patent No. 3292 for the first "coal breaking machine."[21] The breaker at Wolf Creek colliery was one of fourteen erected by Batten using his new invention. He owned the breakers and charged a royalty of one cent for every ton broken. As production increased, many operators reneged on royalty payments and began building their own breakers, often infringing on Batten's patent rights. Batten became embroiled in a series of legal cases over his patent rights, which were finally settled in 1854 by the U.S. Supreme Court, only four years before his patent term lapsed.[22]

Through the 1850s and 1860s, changes in roller technology, the addition of more screens and chutes, and the introduction of washing systems caused an increase in the size of breakers. Since all of the preparation methods depended upon gravity, as the preparation process became more complex the height of breakers increased to permit the gravity flow of coal through the various appliances.[23] In 1883, H.M. Chance reported: "Anthracite breakers as built at present range from sixty to one hundred and fifteen feet in height; large breakers are seldom less than eighty feet high."[24] One early twentieth-century text on mining reported breakers from 50' feet to 185' in height with an "area of the ground plan...as much as 23,000 square feet."[25]

The cost of the breakers, including machinery, ranged from $25,000 to $150,000. Capacity ranged from 1,000 to 4,000 tons per day.[26] Despite the high cost, the pattern of building a specially designed breaker for each mining operation became the norm in the nineteenth century, dictated by the character of the coal mined and by market conditions.

> The coal from different localities and from different seams in any given locality differs in its properties, especially in its specific gravity and in the amount of slate and bone mixed with it. Hence, since the design of a breaker depends on the character of the coal prepared, there is no one type breaker that is universally applicable. If a breaker has been designed to prepare coal from one seam and it is desired to prepare the coal from other seams in the same breaker, it is frequently necessary to entirely reconstruct the breaker, changing the pitches of all chutes and the methods of removing the refuse from the coal, because methods perfectly satisfactory in the former case are not so in the latter.[27]

The impact of market conditions in the mid-nineteenth century is described by Wallace:

> ... breakers produced cleaner coal in a variety of sizes for an increasingly discriminating market; and they could readily be adjusted to produce a different mix of sizes by setting rollers closer or farther apart than the standard three inches. Furthermore, extremely well prepared coal sold at a premium - and a premium of only 5 cents a ton would mean an increase of 50 percent over the normal profit margin of 10 cents a ton. Without access to an independent breaker industry, the colliery operator simply could not compete in the market without a breaker of his own, even though the cost of preparation by breaker - contemporary estimates ranged from 12 to 37 cents a ton - exceeded the cost of breaking by hand.[28]

During the late nineteenth and early twentieth centuries when breakers began to assume their monumental proportions, they were wood-frame structures, usually constructed of pine, hemlock, or oak timber. They were sheathed with wood sheets, and had a considerable number of windows to provide light for the picking process. Often the interiors were painted white, which increased illumination provided by the windows assisted first by lanterns and later by electric lights.[29] (See Attachments No. 1, item nos. 1-10, and No. 2 in Field Record Folder No. 1 of 7, Huber Breaker, HAER No. PA-204.)

BREAKER DESIGN - TWENTIETH CENTURY

By the second decade of the twentieth century, the character of anthracite breakers began to change due to the introduction of new building materials. New breakers were now constructed of steel and concrete, and many older, wooden ones were remodeled replacing the original wood framework with steel beams. Wood siding was replaced with glass, and the breakers began to take on a decidedly "modern" look. Although many were even larger than breakers constructed in the late nineteenth century, the new framework and siding reduced the fortress-like, Romanesque character of their predecessors.

The Loomis Breaker, built in 1914 by the Delaware, Lackawanna, & Western Railroad Company, is a good example of the changing trend of breaker design and construction. The Loomis Breaker was located in Hanover Township, Luzerne County, Pennsylvania. It was built using a combination of reinforced concrete and structural steel.[30] The steelwork reached a height of 164', and the frame was entirely enclosed with glass. Coal Age magazine described the Loomis glass siding as follows:

> One of the most striking features of the breaker is the glass siding, consisting of Fenestra sash glazed with 1\4-in. wire glass, which totally incloses [sic] the structure and gives to it the distinction of being a "daylight breaker" - a new departure in Delaware, Lackawanna, & Western design.[31]

In the following year, 1915, the Delaware, Lackawanna, & Western Railroad Company began remodeling its Truesdale Breaker, also in Hanover Township, and originally constructed in 1905. The wood frame was replaced with steel and new glass siding displaced the old wood siding.[32] Other companies also began similar modernization programs in the same era. In 1919, the Hudson Coal Company built a steel and concrete, glass sided breaker, the Loree in Plymouth, Pennsylvania, in 130 days. The next year Hudson Coal constructed a similar steel, concrete, and glass breaker, the Marvine No. 2, in Scranton, Pennsylvania.[33] (See Attachment No. 1, item nos. 11-15, Field Record Folder No. 1, HAER No. PA-204.)

The above examples represent only a few of the breaker modernization programs initiated by major coal companies in the early twentieth century that affected "Modern" breaker design and construction. Comparable projects existed throughout the anthracite region as companies reacted to changing market conditions; in each case, substantial changes in coal preparation machinery were included as well. These new structures set the standard and style for breakers through the first half of the twentieth century. The Huber Breaker, and others built in the 1930s, were constructed within the conventions established two decades earlier.

HUBER BREAKER - DESIGN AND CONSTRUCTION

The plans for the Huber Breaker were developed during 1937 and construction proceeded throughout 1938. The breaker was built on a colliery site where coal was mined and prepared since 1851. The original mine at this Hartford colliery was sunk in 1851, and the breaker was built in 1856. It prepared coal until 1884, when it burned down.[34] On the same site, a new breaker, the Maxwell, was constructed by the Lehigh and Wilkes-Barre Coal Company in 1895.[35] By 1937, the colliery and breaker, owned since 1929 by the Glen Alden Coal Company, needed extensive modernization as a result of advances in coal preparation technology and market demand for smaller sizes. The company determined the Maxwell Breaker did not lend itself to modernization, and, since it was faced with combining production from other mines for central cleaning, it announced a $2,000,000 improvement program. The program was to include a new breaker and other shops at the colliery.[36]

The Huber Breaker was built adjacent to the west side of the Maxwell. The front of the structure faced south towards South Main Street in Ashley, Pennsylvania. The rear faced the freight yards of the Central Railroad of New Jersey to the north. Wilkes-Barre was to the east with Hanover Township to the west. The structure contained three interconnected components: a coarse-coal receiving unit composed of two sections on the east; a fine-coal processing unit on the west side; and a loading-shipping unit on the north side.[37]

The breaker's total dimensions were 208' x 164' and 132' at the highest elevation of the coarse-coal roof. The steelwork was carried on reinforced concrete columns either 26" or 29" square. Excavation for the concrete columns and bases was to solid rock, in some cases as much as 22' below ground surface. The columns were joined together by sets of tie beams and were poured after the columns were finished with a clean, smooth joint. The concrete mix was one (1) part cement, two (2) parts sand and four (4) parts crushed stone. The concrete columns and tie beams were reinforced by round deformed bars bent cold and varying in size from 3/8" to 1/4" placed on 4, 8, or 12" centers.[38]

Transversely the breaker was divided into sections A,B,C, etc., to N; and longitudinally into bents 1,2,3, etc., to 12. The coarse-coal sections were 112' x 70'. The lower coarse-coal section reached 115', while the higher section reached 132'. The fine-coal section measured 96' by 88' and 85' high. It was recessed 28' from the face of the coarse-coal section on the south side. The loading-shipping component in the rear of the structure measured 157' x 48' x 50'. Four loading tracks passed through this section between bents one and five. A retail road for truck haulage passed from the east through the coarse-coal area to the west out the fine-coal section between bents five and six.[39]

HUBER'S "DAYLIGHT" CHARACTER AND THE INTERNATIONAL STYLE

The most noticeable feature of the breaker was the glass siding, consisting of vertical window columns which enclosed the building, except for a set of horizontal window columns on the north side of the loading-shipping component. The vertical columns on the north and south elevations were either 12'-3"-1/2" or 9'-10"-3/4" wide. On the west and east elevations the columns were either 9'-10"-3/4" or 7'-6". The horizontal window columns on the north side were 157'-8"-5/8" long and 10'-3"-1/2" or 5'-2" inches wide. The breaker was finished with Robertson Protected Metal (R.P.M.) corrugated siding and R.P.M. V-Beam roofing. The loading-shipping section roof contained thirty-nine Robertson Depressed Head Skylights and six 30" Robertson Ventilators. In the south elevation an opening approximately 15' above ground level was provided for a fuel conveyor to the adjacent power plant. The main conveyor opening was placed on the east elevation approximately 106' above datum. Fourteen foot metal rolling doors of varying widths covered the entry and exit bays for the loading tracks and retail road. Two man-way doors on the east and three on the west completed the breaker's exterior features.[40]

The columnar window treatment of the breaker gave it a "daylight" character comparable to the Delaware, Lackawanna, and Western Loomis breaker described above. This earmark seems to place the Huber Breaker into an industrial architectural lineage which includes the turn of the century factories and grain elevators of North America and the architectural style, designated as "modern architecture" or the "International Style", exemplified by the German Fagus factory of 1911, the Bauhaus buildings of the 1930s, and other seminal buildings designed by Gropius, Le Corbusier, Mies van der Rohe, Wright and other architects of the movement.[41]

The term "International Style" was first used in 1931 by Alfred Barr, the director of the Museum of Modern Art, in reference to an exhibition on "International Architecture" sponsored by the museum in 1932. The first public appearance of the term was in the exhibit's catalogue published by the architect, Philip C. Johnson, and the critic and historian, Henry-Russell Hitchcock.[42] The exhibit featured the work of European and American architects, who were designing buildings characterized by three aesthetic principles:

> ...emphasis upon volume - space enclosed by thin planes or surfaces as opposed to the suggestion of mass and solidity; regularity as opposed to symmetry or other kinds of obvious balance; and, lastly, dependence upon the intrinsic elegance of materials, technical perfection, and fine proportions, as opposed to applied ornament.[43]

The International Style, and the buildings of its architects, set the standard for modern architecture for years, and it remains one of the most influential architectural movements in the world.

The connection between anthracite breakers and this influential architectural movement begins much earlier than the late 1930s. It can be observed, first, between the architecture of nineteenth century anthracite breakers and the architectural characteristics of the great grain elevators of Buffalo, New York, built in the same era; and which, according to Reyner Banham, provided inspiration for the International Style.[44] (See Attachment No. 1, item nos. 3-10, and Attachment No. 3, item nos. 1-2, Field Record Folder No. 1 of 7.)

The architectural similarities of the structures apparently appeared for the same functional reasons. The nineteenth century anthracite breaker evolved in size and form as a result of increasingly complex mechanical technology necessary for coal preparation. As for the elevators, Banham points out:

> What prehistory the type does have is chiefly the evolution of the mechanical system to move the grain in and out of the storage bins. What makes an elevator an elevator is not that it occupies a particular building form, but that it has machinery for raising the grain to the top of the storage vessels.[45]

And the same is true for a breaker: What makes a breaker a breaker is that it has machinery for preparing coal, and the preparation process required that the coal be lifted to the top of the structure to take advantage of gravity. Perhaps both the grain elevators and coal breakers can be viewed as "giant machines" standing out in the weather, enveloped in a skin, rather than buildings with machinery inside.[46] The characterization of breakers, at least, as "giant machines" is reinforced by a review of coal preparation literature from the nineteenth century through the first half of the twentieth century. Very little attention is given to the architectural detail of breakers, but, rather, the focus is almost completely on function. Authors seem to care very little about how breakers were constructed or how they looked. What mattered was how they worked.[47]

If the Huber Breaker's connection to the International Style of architecture begins with nineteenth century grain elevators, its bond to the movement as a "daylight factory" is clearly cemented when it is compared to the extraordinary structures typically used to define that style. Whether one uses the 1911 Fagus factory in Alfeld, Germany, the 1915-17 Bethune Hall of the State University of New York at Buffalo (formerly Buffalo Meter Company), the 1920s Bauhaus buildings in Dessau, Germany, or even the 1940s campus of the Illinois Institute of Technology, the style of the Huber Breaker is clearly in the same mold as these examples of modern architecture. The breaker's window treatment gives the same "transparent glazing" effect of Bethune Hall.[48] It has glass facades or "curtain walls - skins or membranes stretched tautly over the structural framework of the building behind the glass," similar to the Fagus factory.[49]

Architecturally, the breaker's principal element is the glass sheathing, as was the case with the Bauhaus buildings.[50] The Huber Breaker is clearly a structure built within the tradition of the International Style, and, as such, needs to be studied further in that architectural context. (For a graphic representation of the similarities noted, see: the various historic photographs for PA-204 and Attachment No. 3, item nos. 3-7, Field Record Folder No. 1).

Throughout its working history, the Huber Breaker retained its sleek daylight factory appearance, despite the fact millions of tons of dirty, wet coal were processed through it over a period of thirty-five years.[51] In 1991, however, after fifteen years of abandonment and vandalism, the breaker has lost its radiant appearance. The breaker's blackish-grey steel siding and hundreds of broken windows attract one's eye. Surrounding the breaker, a layer of black coal dust covers the whole colliery adding to the gloomy atmosphere. Mounds of fine coal undulate throughout the property, while a range of weeds, white birch and sumac trees have sprouted everywhere. Asbestos insulation hangs loosely from steam pipes. Wood and metal debris endanger every footstep.[52] One quickly experiences a feeling of industrial exhaustion rather than architectural exhilaration. The breaker and colliery stand in stark contrast today to the bustling industrial complex which began operation in 1939.

COLLIERY OPERATIONS/COAL PREPARATION PROCESS

In 1939 the Huber colliery was the product of over a half a century of mining operations and a site improvement program initiated in the late 1930s. Five separate mines (#20 Shaft, #7 Slope, #8 Slope, #10 Slope, and #4 Slope) operated in the immediate vicinity of the approximately thirty acre surface operation. The freight yards of the Central Railroad of New Jersey (CRNJ), one of the five major carriers of anthracite coal, were immediately to the north of the colliery. The twenty-five CRNJ tracks provided access to markets for the coal mined and prepared at the colliery.[53] Although no list of the Huber colliery surface structures in 1939 exists, it can be assumed, based on Glen Alden's Physical Assets of 1949, the surface operations included forty or more structures.[54] More than a dozen new structures were constructed between 1937 and 1939. These included: the Breaker, the Boiler House (Power House), an Aerial Tramway with Loading Tower, Office and Retail Scales, a Garage, the Foothouse-Courthouse, the Foreign Coal Dump (Dump Hopper House), a Dorr Thickener, the Head Frame and Shaft Conveyor Head House, a Coal Inspector's House, a Storehouse and Supply Shed, a Lamp House, and a Wash House.[55] The new breaker, of course, was the central structure, both functionally and architecturally, of this modernized colliery. However, since it was only one structure in a integrated complex designed to support the mining operations and prepare coal for market, the other facilities deserve some consideration.

POWER PLANT
(HAER No. PA-204-B)

The first building constructed as part of Glen Alden's improvement program was the Huber Power Plant.[56] Put into operation in 1937, the power house was built in anticipation of the new breaker and to supplement power produced by Glen Alden's Nanticoke power plant. The Huber plant was a coal fired, steam generating facility that developed electrical energy for the Ashley colliery and other Glen Alden facilities throughout the Wyoming Valley.[57] It was a two-sectioned, three-story, brick building over 68' at its highest elevation and 115'-6" x 85'. The brick work included decorative soldier and rowlock courses, along with corbels and reinforced concrete sills above and below the windows. The north east side contained eighteen sets of window panels, while the north west side had thirty-three sets. The building had a flat, slag covered roof surrounded by reinforced concrete coping.[58]

Three circular concrete bins or silos were connected to the northeast elevation of the power house. Each was 55' high and 24' wide. The two end bins had 3' x 7' entry doors on the south elevation. Steel windows which pivoted near the top and measured 12" x 18" were fitted at the apex of the bins. Structural steel beams to support a floor and conveyor were provided and installed by the Nicholson Company of Wilkes-Barre, Pennsylvania. The bins were connected to the breaker by a bridge carrying a chain-scraper conveyor 56' above ground level.[59] Buckwheat #4 coal, from the breaker, was delivered to a hoist tower and then to the bins for storage. The coal was stored for 24 hours to reduce its water content. The bins had chutes at the bottom which moved the coal to a bucket conveyor used to raise the coal to another conveyor. From there, the coal moved to bunkers over the boilers inside the power house.[60] During 1939, the power plant used over 57,000 tons and during the first decade of operation consumed a average of nearly 70,000 tons of coal per year.[61]

The power house generated power at levels considered the highest in the anthracite region. Four Stirling boilers, each with a capacity of 40,000 pounds per hour, supplied the steam. The boilers were fired by Coxe traveling-grate stokers, 17'-10" long and 12' wide. The plant produced 160,000 pounds of steam hourly at a temperature of 632 degrees Fahrenheit. Its turbo-generator yielded 7,500 kilowatts. Water for the power house was supplied by the Spring Brook Water Company from nearby Solomon's Creek. The water was treated with zeolite to prevent scaling on the high temperature boilers. The power house stack rose to a height of 210', the highest structure at the colliery.[62]

ADMINISTRATIVE-SERVICE BUILDINGS

At the far east end of the colliery, connected to Main Street Ashley, by a gate and entry road, the company erected a complex of administrative-service buildings. Central to this area was the new office building. It was a single-story brick structure, 15' high and 79' x 61'. A soldier course of brick surrounded the building above the double-hung windows installed on all sides. Directly in front of the building, retail scales were installed to weigh trucks upon entry and exit. A 6 foot x 21 foot glass enclosed scale office faced the scales.[63] Around the corner from the office and retail scales, a 41' x 29' brick garage was built to house the colliery ambulance, superintendent's car, and the colliery truck. It had a decorative soldier brick band similar to the colliery office. The three vehicle bays were covered by steel-roll top, chain operated doors.[64]

A store house and supply shed, crucial to the efficient operation of the colliery, were provided near the colliery office. These facilities were necessary to maintain a constant supply of materials used to repair the great assortment of machinery employed both underground and on the surface. One indication of the frequency of repairs at the Huber colliery was the number of men employed in the breaker as repairmen. According to George Cashaunas, the breaker foreman through the 1950s and 1960s, the number of repairmen equaled the number of breaker machinery operators, roughly seventy of each. Repair crews worked all night replacing parts in addition to a significant amount of emergency maintenance conducted during the day shifts when coal was processed.[65] One estimate suggests the cost of supplies was seventy cents per ton of anthracite produced. The Huber colliery produced an average of 1,634,639 tons yearly during the decade of 1939-49. The cost of supplies then would be approximately $1.1 million per year.[66]

The 38' x 95' brick storehouse was connected to the large supply shed; a covered dock area which was the main receiving area for the colliery. The store house was equipped with a large room containing 20 floor-to-ceiling storage cases. It included office space and an oil house, fitted with oil pumps and a screened service counter where lubricating oil was distributed to maintenance men. The store house brickwork was identical to the decorative scheme of the other buildings in this area of the colliery.[67]

Completing the east end administrative-service area were the colliery shops, a timber warehouse, and a sand dryer. The shops included a range of machines used to repair, or in some cases rebuild, mine cars, motors, pumps, hoists and other equipment on site. Glen Alden maintained central shops in Exeter, Pennsylvania; however, these shops apparently only did major repairs, and, in fact, were used mainly as an equipment manufacturing facility. The timber warehouse stored and supplied the vast amount of wood used underground as structural supports for the various mines. Sand was used to provide traction on car rails both underground and on the surface. These buildings were steel or concrete.[68]

WASH HOUSE - LAMP HOUSE

Adjacent to the administration-service area to the west,two buildings, the wash house and lamp house, provided essential services to the Huber miners. The lamp house was perhaps one of the most important facilities on the surface, especially from the miners' point of view. Here, mining safety lamps, used to detect potentially explosive gas accumulations underground, were stored and serviced daily. The wash house provided a safe area for the miners street clothes during a shift, and allowed the miners to shower before going home. Both of the buildings were brick structures, designed consistent with the other buildings in the administration-service area.[69] The remaining surface structures functioned as an integral part of the coal preparation process at the colliery, and each will be considered in the preparation process description which follows.

OPERATIONAL PROCESS

The Huber colliery operational process activated in 1939 was an adaptation of the "self-contained commodity-processing" system which evolved in the anthracite industry during the nineteenth century. Described by Wallace, it was a system, different from other commodity systems, where:

> all processing was done at one place by one firm, which extracted the material from the ground and performed all the subsequent operations upon it that made it ready for the consumer. Each colliery was a self-contained commodity-processing unit that had virtually no connection with any other colliery (not even with other collieries owned by the same firm).[70]

At complete-process collieries, Wallace continues:

> coal flowed in an uninterrupted stream from the bottom of the mine, up the shaft or slope to the top of the breaker, where it tumbled down through rollers and screens and chutes to railroad cars waiting below.[71]

At Huber, this established system was adapted by the introduction of mine-run coal from Glen Alden's Buttonwood and Inman mines, several miles north of the colliery. The adaptation toward centralization of coal processing was the result of diminishing and changing markets for anthracite coal. In 1939, total anthracite production was only 61.5 percent of the production levels achieved during the period 1919-21.[72] This dramatic decline is explained especially by sales losses for heating purposes to gas and oil, and a notable decrease in anthracite utilization by railroads. In 1921, over 68 million tons of anthracite were used for heating. By 1939, anthracite distribution for heating was reduced to 37,644,000 tons. The railroads used over 4.5 million tons in 1921, while in 1939 railroad consumption dropped to 1.8 million tons.[73]

Increased demand for smaller sizes also influenced the beginning of central processing at the Huber Breaker, which was designed to prepare the fine sizes more effectively. Industry figures demonstrate the market for smaller sizes changed radically. Between 1935 and 1951, shipments of large sizes such as egg, lump, stove, and chestnut, decreased. Egg shipments dropped 64.6 percent during the period. On the other hand, shipments of the three smaller sizes (No. 5, No. 4, No. 3 Buckwheat), increased with No. 4 Buckwheat swelling 165.5 percent.[74]

The trend toward centralized processing would increase throughout the working history of the Huber colliery. By 1955, for example, Huber was processing coal from eight different Glen Alden operations.[75] Centralized processing, in fact, became the standard Glen Alden policy in the two decades after Huber opened. Smaller, less efficient breakers closed (for example, the Bliss in 1949), in favor of larger, technologically modern ones such as Huber.[76]

LINEAR FLOW AND COAL ASSEMBLY

The operational flow at the Huber colliery was a linear one. All coal, water, unloading and loading systems, and refuse generally moved east to west. Mine-run coal from the five Huber mines and the Buttonwood and Inman mines converged at the foothouse at ground level on the east side of the breaker.[77] Coal from the Huber mines was delivered to the breaker foothouse through a rotary car dump or a shaft headhouse. Both the rotary car dump and the shaft headhouse were structures containing machinery used to unload full mine cars as they reached the surface. In the rotary dump, loaded mine cars from the No. 5 slope mine were rotated 180 degrees to dump the coal onto a conveyor. Empty mine cars were then returned underground for another load. In the shaft headhouse, four hoisting bays allowed loaded cars to be elevated to the top of the structure where they were tipped to dump the coal on to a conveyor.[78] The foreign coal, from the Buttonwood and Inman mines, arrived at the colliery by rail. The rail cars proceeded through the foreign coal dump and released coal into four hoppers. This coal was then conveyed to the foothouse.[79] In the foothouse the assembled coal received a preliminary screening and hand picking before it was transported to the top of the breaker.[80]

A 450' long chain scraper conveyor delivered the coal to the top floor of the breaker, 117' above ground level. In 1939, Coal Age reported:

> Preference is shown to a scraper conveyor because its carrying capacity allows it to run at a lower speed - 102 feet per minute - than a belt, and thus it will not break the coal as much at the point of delivery.[81]

The conveyor, which had 10" x 60" flight paddles connected by 18" Link Belt Silent chains, was driven by a 350 horsepower (hp) General Electric motor over a 435' span from the foothouse to the breaker. It was controlled by a single switch by an operator at the top of the breaker.[82]

When the coal reached the top floor of the breaker, the coal stream split in two directions, part going to the right and part going to the left side of the breaker. Beginning at this stage, and continuing throughout the preparation process, the coal was washed with calcium hydrate-treated mine water pumped to the surface and circulated in the breaker at 7,000 gallons-per-minute. The dirty water was pumped to a Dorr Thickener, 120' in diameter, which removed the silt, and the clean water was recirculated in the breaker.[83] The coal then began its descent in the breaker, through a series of processing stages and various mechanical devices.

BREAKER PROCESSING STAGES

The processing stages used in the Huber Breaker were five separate, yet interconnected ones: the Mine-Run Coal Process, the Coarse-Coal Process, the Fine-Coal Process, the Menzies Cone Process, and the Prepared-Coal Loading Process. Each had a distinctive purpose and used mechanical devices, installed and arranged in the breaker, to perform key functions in the overall task of cleaning and preparing coal of various sizes for market.[84]

BREAKER MECHANICS

Throughout the various preparation stages, several industry standard sizing and separating devices were used in the breaker. Shakers or shaking screens separated the coal into different sizes. Screens were steel plates perforated with round holes representing the standardized marketable sizes established by the Anthracite Institute, the industry's trade association organized in 1925.[85] The standardized screen-hole sizes were as follows:[86]

SIZES	SCREEN HOLES - INCHES DIAMETER (through)	(over)
Broken	4 3/8	3 1/4
Egg	3 1/4	3 7/16
Stove	2 7/16	1 5/8
Chestnut	1 5/8	1 3/16
Pea	1 3/16	9/16
Buckwheat	9/16	5/16
Rice	5/16	3/16
Barley	3/16	3/32

As the coal passed over the screen, the pieces smaller than the holes passed through, while the larger ones passed over the end of the screen. Usually several screens with openings of decreasing sizes were layered together horizontally, slightly inclined to facilitate coal movement, and driven back and forth by an eccentric motor and connecting rods. The screens were supported by wooden springer boards which were adjusted to provide the proper throw. The shaker screens varied in width from 4' to 8' and 13' to 17' in length. They were named according to the coal sizes separated in the unit.[87] Dewatering shakers, of similar design to the sizing shakers, were used to remove excess water from the prepared coal as it exited from the Menzies Cones prior to being stored or shipped.[88]

Picking shakers or tables were used at the preliminary, mine-run stage to separate refuse from the coal by hand. Each table had two independent sections that shook atop spring boards connected by flexible wooden arms powered by an electric motor. The tables were slightly inclined and varied in length from 16' to 36' and were 4' wide. Each moved slowly back and forth with an approximate 18" stroke which leveled and spread out the coal and refuse to facilitate picking. Five men worked at each table. They picked off refuse and deposited it into chutes which directed the refuse out of the breaker. At the mine-run stage, large rocks removed from the tables often had to be broken with sledgehammers before being deposited into the refuse chutes.[89]

As the coal flowed off the shaking screens or picking tables, sizing continued as the coal passed through a series of rollers or rolls which broke the coal into commercial sizes. The rolls were two metal cylinders, fitted with teeth and suspended on a shaft, which rotated toward each other. The rotating motion of the cylinders broke large pieces of coal into designated sizes regulated by the tooth arrangement and the spacing between the cylinders. Roll sizes varied from 60" to 12" in diameter, and the height of the teeth varied from 8" to 0"-7/16". The largest could crush 300-400 tons per hour, while the smallest, fine coal rollers had a capacity of 10-15 tons per hour. The rollers, depending on their size, were powered by 15 hp to 60 hp electric motors. Fifteen separate roller mechanisms were utilized throughout the Huber Breaker.[90]

MINE-RUN COAL PROCESS

As the two coal streams descended from the top floor, each passed over a double screened, "bull" or lump-and-steamer shaker. The smaller pieces fell through the bull-shaker screens to the third deck, and ran through a set of grate, egg, stove, and nut shakers to picking shakers where debris was picked by hand. The lump and steamer sizes proceeded to picking shakers on the second deck where impurities were picked by hand.[91]

Throughout the breaker's history, disposal of rock at the lump and steamer picking table level proved problematic, especially in the 1950s and later when the breaker processed ever increasing amounts of stripped coal which contained high quantities of refuse. George Cashaunas, breaker foreman from the 1950s to 1968, described how the men working the lump and steamer picking table would pile rock on the floor, sometimes to a height of five or six feet. Often these men would work four to six hours overtime to break up the rock which accumulated during the day. Increases in refuse content reduced the breaker's production substantially from its capacity of 7,000 tons a day to 5,500 or 6,000 tons, according to Cashaunas. Refuse slowed processing at the top of the breaker, but the movement of coal throughout the breaker was also affected by refuse increases. Cashaunas explained that an influx of rock and other refuse would jam the chutes, forcing workers to push the coal through using hand-made wooden "pushers". By the late 1960s and early 1970s, stripped coal brought to Huber for processing frequently contained 70 to 80 percent refuse.[92]

After the picking on the second deck, the lump and steamer coal on both sides of the breaker flowed to a pair of rollers which crushed it to grate, egg, and smaller sizes. The coal then dropped to the third deck, where, along with the coal from the third deck picking tables, it was broken in either egg or stove rollers.

COARSE-COAL PROCESS

At this point, the coal entered the second processing stage, the coarse-coal process. It was screened and rolled again to prepare the coarse sizes for shipment. Six long shakers separated egg, stove, and nut sizes. The fine coal which fell through these shaker screens went to a fine-coal settling tank prior to entering the fine-coal section of the breaker. Each of the coarse coal sizes passed from the shakers to one of six Menzies Cone separators for final washing and separating before loading.[93]

MENZIES CONES

The utilization of Menzies cone separators for final cleaning was one of the outstanding features of the Huber Breaker and represented the implementation of the latest improvement in a long line of coal washing equipment developed in the anthracite region.

As previously noted, coal, as it comes out of the ground, is mixed with a multiplicity of impurities. In the early nineteenth century miners cleaned coal by hand underground, but as market conditions changed, reflecting increased demand for finer sizes, various methods and devices were developed to remove impurities on the surface in the first breakers. As the nineteenth century progressed, most cleaning was done by young boys or old men who hand picked refuse out of the coal as it flowed through an arrangement of chutes in the breakers. By the late nineteenth century, however, experiments with mechanical cleaning equipment became prevalent in the industry. This was particularly true in the anthracite region where the steeply pitched coal veins required the loading of large amounts of refuse material.

The opening of the twentieth century saw the development of a veritable coal cleaning equipment industry which serviced the preparation demands of the coal producing companies. The list of devices and processes developed is incredibly diverse and voluminous. It included: mechanical pickers; various types of jigs; concentrating tables; heavy medium processes, such as the Chance process; hydroseparators, hydrotators, and cone separators, all employing water as the separating medium; flotation systems; and de-dusting systems. Similar developments continued through the 1940s, 1950s and 1960s when the amount of fine coal mined increased as a result of mechanized methods and market demand for fine sizes increased. These decades saw the development of new, more sophisticated classifiers, launders, and heavy-media separators designed to recover high percentages of coal from refuse. One such system, the Dyna Whirlpool Process, developed by Wilmot Engineering Company, was installed at the Huber facility in 1963.[94]

The Menzies Cone, developed in 1934 by W. C. Menzies, was a coal washing machine utilizing an upward current of water to affect a separation between coal and its impurities. The machine worked on the principle that coal has a lower specific gravity than its contaminants; such as slate, rock, bone, or clay. So, once the lighter coal was fed into the cone, the upward current of water carried it over the top, leaving the impurities behind.[95] In 1935, Coal Age described the operation of the machine:

> This separator embodies the water-balance principle of automatic regulation. The coal is washed in a cone surrounded by manifolds which deliver streams of water to all parts of the cone except near its top. Raw coal enters a well around the vertical shaft of the agitator and is carried down by the walls of the well into the cone. Upwardly rising water and agitator arms stratify the raw feed into its various gravities; the clean coal rises and passes out over the top of the cone to the dewatering screens, while the slate, bone and other impurities fall against the inrush of water through the tubular section at the bottom of the cone into an inclined scraper conveyor, which elevates and discharges it by a chute at the end of its travel.
>
> The refuse conveyor is in a casing which is watertight, and connected to the casing is a standpipe with a "V" notch weir at the top to the right of the separator. When refuse or middlings accumulate within the cone, they retard the passage of water from the conveyor casing through the tubular section into the bottom of the cone. This increases the head of water in the conveyor casing to such an extent that the water flows through the "V" notch weir in an increasing quantity and correspondingly decreases the flow of water through the tubular section at the bottom of the cone. When the upward flow or velocity of water through the tubular section is decreased, the refuse falls through the tubular section into the conveyor. After discharging refuse from the cone, the resistance to the flow of water through the tubular section decreases and the head of water in the conveyor casing decreases to such an extent that little or no water passes through the "V" notch weir; consequently increasing the upward flow or velocity of water through the tubular section. This results in less refuse being discharged into the conveyor and in the maintenance of a bed of middling materials within the cone, on top of which the pure coal floats or stratifies.
>
> Thus, whenever the density of the fluid in the cone becomes excessive, due to impurities in the feed, less water enters the cone, a quantity of refuse is discharged and the specific gravity is reduced to the desired figure. If, however, the feed is inadequate, the fluid in the cone makes little resistance and the water rushes into the cone in such volume that little refuse can escape and the specific gravity builds up to the required standard. By careful adjustment, the cone is enabled to work with equal efficiency regardless of the volume of feed or its specific gravity. It is, therefore, self-adjusting, with its required

specific gravity automatically determined by the variable velocity of a rising current of water.[96]

Fourteen of the Menzies units were installed at the Huber Breaker in 1939. Each of the commercial sizes was treated separately. Twelve cones were 9'-4" in diameter and two were 7'. Each prepared approximately one ton per hour per square foot of area of the top of the cone. Each used 8,000 gpm of circulating water.[97] The Menzies cones were the principal coal washing units at Huber until the 1950s when new technology complemented their use.

William C. Menzies was a mechanical engineer from Scranton, Pennsylvania, who began his career as a draftsman with the Pennsylvania Coal Company. In the 1920s, he developed a hydroseparator for cleaning coal in which water was circulated continuously by a centrifugal pump. The device was widely adopted both in the anthracite and bituminous coal regions.[98] Menzies installed his first experimental cone unit at Glen Alden's Nottingham colliery in Plymouth, Pennsylvania, in 1932. Two years later he formed the Menzies Separator Company in Scranton and began selling the cone units commercially. In the first year the company installed eight units in the anthracite region, and, by 1936, a number of breakers in the region used the cones exclusively; the Clear Spring breaker at West Pittston owned by the Sullivan Trail Coal Company.[99]

The Menzies Separator Company continued to design and market cone cleaning units through the 1940s. The units were fabricated by the Finch Manufacturing Company, a foundry and machine works established in 1857 and one of Scranton's oldest continuously operating businesses. In 1951, the Menzies Separator Company evolved into a larger mechanical engineering enterprise erecting and supervising coal breakers. By the mid 1950s, the company was absorbed by the Finch Company. In 1959 the Finch organization moved from Scranton to Exeter, Pennsylvania, occupying the machine shop facilities of the Glen Alden Company.[100]

FINE-COAL PROCESS

Throughout the initial processing stages, all of the fine particles of coal smaller than chestnut size fell through the various screens and were directed by conveyor and elevator to the fine-coal section of the breaker. There, on the fourth level of the breaker, the fine coal entered the final cleaning and sizing stage.

Two fine-coal conveyors, an upper and lower, carried the particles to the fine-coal elevator positioned in a central shaft between columns G and H and bents 9 and 10 in the breaker. The upper conveyor carried the fine coal from the mine-run and coarse-coal shakers and the lower conveyor routed particles from the coarse-coal Menzies cones. The conveyors were 180' and 117' long respectively; each having 8" x 24" paddles connected by 6" chains. The fine-coal elevator with 15" x 22" x 30" buckets connected by two strands of 9" chain, each 156' long, carried water-logged fine coal particles through a 68' high shaft and dumped the buckets into a Fine-Coal Settling Tank. The water collected in the tank while a continuous conveyor, with 10" x 50" paddles, removed the particles which were conveyed to six fine-coal shakers.[101]

The fine-coal shakers contained a set of four screens representing each of the fine-coal sizes: pea, buckwheat, rice, and barley. Pea and buckwheat sizes proceeded directly to a Menzies cone for final washing. The rice and barley sizes were conveyed once again before entering a Menzies cone. Six Menzies cones, two for pea, two for buckwheat, one each for rice and barley, were utilized as part of the fine-coal process. All of the cleaned fine coal proceeded to storage pockets to await loading. Six pockets, or hoppers, were constructed of metal and lined with cypress wood to reduce breakage. The pocket floor rose to an angle of 37 degrees. Coal was loaded directly from the pockets into railroad cars or trucks on the ground level of the breaker.[102]

LOADING-SHIPPING PROCESS

The final step of coal preparation, loading and shipping, occurred at ground level on the north side of the breaker. There, four railroad tracks, one each for fine, nut, stove, and egg sizes, and a truck road allowed empty cars and trucks to enter the breaker for loading. The nut, stove, and egg sizes were loaded into the railroad cars by long belt booms, 48" wide, which were lowered into the cars to prevent coal breakage, permitting size uniformity on delivery. The booms were controlled by an operator positioned in a control booth overlooking the loading area.[103]

BLUEING

During the loading process, all prepared coal, pea size and above, was sprayed with a bluish "peacock hue iridescent coating" used to identify the coal as "Blue Coal" in the marketplace. Described as a "harmless tint" used for the consumers' protection in the company's promotional film produced in the 1940s, no evidence seems to exist regarding the chemical composition of the coloring.[104] In 1939, Coal Age reported:

> Reagents from two carefully calibrated pumps are mixed in regulated quantities, so as to produce the film on the coal. Yet this film is so thin as in no way to modify the quality of the fuel or prevent inspection of each individual piece. After the treatment, the coal is sprayed, but the coating, being both insoluble and adherent is not removed.[105]

Glen Alden, through its sales division, promoted its anthracite both regionally and nationally by using the "Blue Coal" trademark. Advertising campaigns encouraged consumers to "take the guesswork out of fuel buying" by purchasing "America's Finest Anthracite" with the famous "blue tint." Brochures, distributed by the company, explained:

> Of course, nature makes coal in only one color - all of it is black. But we wanted a special way to identify the "cream" of the Pennsylvania anthracite that is selected to become 'blue coal'. So we spray it with a harmless blue dye before it leaves the mines. The result: 'blue coal' is trademarked just as refrigerators, coffee, toothpaste or any other quality product is trademarked. You don't buy "blind" when you order 'blue coal'.[106]

COAL INSPECTION

Before leaving the colliery, the loaded railroad cars passed through a coal inspector's house. Coal samples were taken from different points in randomly selected cars. The samples were weighed and tested against standardized size and impurity specifications in the coal testing laboratory located near the west side of the breaker. After the inspection, the loaded cars were marked for destination and they proceeded out of the colliery.[107]

REFUSE DISPOSAL

The mining and preparation of coal at the Huber colliery produced approximately 600 tons of breaker refuse and 200 to 300 tons of mine rock daily. Disposal of such a high volume of refuse required an innovative approach, especially since the colliery was located between the yards of the Central Railroad of New Jersey and the main street of Ashley. The problem was solved with the anthracite region's first aerial tramway for refuse disposal. Breaker refuse and mine rock were carried on the tramway over 25 tracks of the Jersey Central and two tracks of the Lehigh Valley Railroad to two 80,000,000 cubic foot dumps at the west end of the property.[108]

The aerial disposal tramway consisted of five major components: the breaker loading terminal, the continuous bucket-conveyor tramway, a transfer tower and bin, and two separate two-car tramways. It spanned over 3500' and ranged from 33' to 250' high.

The breaker loading terminal was 41' high with a 30' south elevation and a 26' east elevation. The R.P.M. sided structure was connected to the breaker by a belt-conveyor bridge. It contained a conical loading bin, 12' at the top and 6' at the bottom.[109]

The continuous, bucket-conveyor tramway, used to cross the tracks adjacent to the breaker, consisted of:

> 22 four-wheeled shallow cars, or carriers, of 22.4 cu. ft. water level capacity, traveling at wide intervals on two 1 1/4 in. lock-coil type cables which act as rails....Cable links are 164 ft. long and, when coupled, become in effect an endless rope haulage, driven at the discharge, or "transfer terminal," end of the continuous tramway by a 76 in.-diameter tail sheave. This grip wheel is activated

through a helical steel gear and V-belt drive by a 30-hp. motor running at 900 r.p.m.[110]

The tramway was supported by four towers ranging from 33'-4" to 69'-10" in height. The towers also supported a 1,200' long and 10' wide mesh steel screen used to catch refuse falling from the carriers. The carriers automatically entered the breaker loading terminal and were loaded to capacity by a reciprocating plate feeder. Filled cars were carried along the tramway to the transfer terminal approximately 1800' from the breaker. There, the cars were unended and returned empty to the loading terminal "along a pair of 3/4 in. lock coil track cables suspended immediately below the cables on which the same cars when loaded travel toward the transfer tower."[111]

At the transfer terminal, the refuse was dumped into a 2,500 cubic foot capacity cylindrical steel bin with a conical bottom. Two two-bucket tramways angled at 26 degrees 52 minutes allowed refuse to be deposited in either of the two dumps. The 100 cubic foot capacity buckets were equipped with a tripping mechanism which allowed dumping at any point along the tramway. The whole system was operated by a single workman at the transfer terminal.[112]

The Huber aerial disposal system functioned until May 1949, when a heavy windstorm destroyed the continuous, bucket tramway. The company replaced the tramway with belt conveyors elevated over the railroad tracks by a newly constructed bridge. The new conveyor system transported refuse to the transfer terminal where the remainder of the aerial system continued to operate.

Beginning in the early 1940s and continuing through the early 1960s, the Huber refuse bank caused major problems for Glen Alden. A large section of the bank, containing approximately 150,000 tons, began to burn in 1941. Although several attempts were made to extinguish the fire, it continued to burn through 1948. After several years of work, including segregating the fire by building a moat and pumping 1200 gallons of water per minute on the fire, the flames were extinguished. However, fires began in other sections of the bank in 1956 and 1958. These fires remained a constant drain on the company's financial resources and produced extensive negative publicity. The company spent $300,000 in 1958 alone, yet the fires continued to burn into the 1960s. By 1963, company executives estimated the control of the refuse bank fires at Huber and other locations would cost $6 million.[113]

HUBER MODERNIZATION AND GLEN ALDEN REORGANIZATION IN THE 1950s

The Huber Breaker and colliery operated for ten years based on the design and technology implemented in 1939. Beginning in the 1950s and continuing into the early 1960s, however, the complex underwent a series of coal preparation modernization programs. One reason these programs were initiated was the company's desire to avoid future refuse bank fires similar to those described above. Glen Alden officials believed the installation of more efficient separating equipment would lower the amount of combustible material sent to the refuse banks; therefore reducing the possibility of spontaneous firing of the banks.[114] More compelling reasons for modernization existed than the control of refuse bank fires, however.

After the boom years of World War II, Glen Alden, and the rest of the anthracite industry as well, was faced with declining production and markets, increasing competition from gas and oil, changing consumer attitudes favoring automatic home heating equipment, changing markets for smaller coal sizes, and declining profits. These deterrents to company stability caused Glen Alden to embark on an inclusive plan to consolidate and modernize its coal production facilities and reorganize the administrative structure of the company.

The plan began on January 23, 1952, when Gilbert S. McClintock, Chairman of the Board of Directors of Glen Alden Coal Company, announced a comprehensive study of anthracite market conditions commissioned by the board. (Another study, by the Paul Weir Company, was apparently commissioned at approximately the same time to assess Glen Alden's operations and management procedures. However, no public announcement was made regarding this study.[115]) The announced study, conducted by engineers of the Electric Bond and Share Company (EBASCO), was described by McClintock as:

> an analysis of the long-term trends in the anthracite industry in relation to oil, gas, coke and bituminous coal competition and the economic and competitive position of anthracite and its future outlook and probable future markets. [116]

McClintock's disclosure most certainly was conditioned by a series of particularly gloomy company annual reports. The local press reported the figures for the three year period 1948-1950:

> Glen Alden annual reports for the three-year period from 1948-1950 show net sales dropped from $105,440,541 in 1948 to $84,592,211 in 1949, advancing to $88,230,649 in 1950.
>
> Anthracite sold in 1948 totaled 9,457,331 tons - a 1.3 per cent increase over the 1947 total - while in 1949 it dropped 22.9 per cent to 7,286,994 tons, gaining slightly in 1950 when it was 7,335,635 tons.
>
> Gross profits from sales declined from $17,118,273 in 1948 to $11,356,516 in 1949 and to $10,685,777 in 1950.
>
> Selling, general and administrative expenses were cut in the same period from $8,416,572 in 1948 to $7, 936,365 in 1949 and to $7,867,382 in 1950.

> Net income, after provision for federal income taxes, plummeted from $6,363,625 in 1948 to $2,890,313 in 1949 and $2,228,617 in 1950.[117]

And the trend for the first half of 1951 was equally as dark:

> A net loss of $126,452 was reported during the first six months of 1951, contrasting with a $1,287,888 net profit during the corresponding period in 1950. The company had net sales of $41,701,481 and gross profits from sales of $3,388,351 during the first half of 1951.[118]

The company's condition was further complicated by the death of its President, Edward Griffiths, on October 24, 1951, and rumors persisted that the management-engineering study would be followed by widespread administrative changes.[119]

Both business studies were completed in July, 1952. However, by April of that year, the company had already taken steps toward the modernization of its coal preparation facilities. On April 17, 1952, the local press reported the approval of several projects by the Defense Solid Fuels Administration for the installation of fine-coal cleaning plants at Glen Alden's Truesdale and Huber collieries. The Wilkes-Barre Record reported "the cleaning apparatus at Huber will cost $55,000 and will be used for the preparation of No. 4 and No. 5 buckwheat at the Ashley operations."[120]

The data and recommendations of both reports indicate each consulting firm saw the need for wide scale changes in the management and operations of Glen Alden if the company was to remain at all competitive. Both reports recommended a substantial concentration and modernization of Glen Alden's mining and processing facilities in light of transforming market conditions and the company's past record of small reinvestment to improve its properties. The EBASCO report, after evaluating the economic and competitive position of anthracite, recommended:

> Above all and in spite of the natural obstacles, the industry must seek every possible means to mechanize in order to reduce production costs. Also, production conditions point to the need for investigating the possibilities of closing noneconomical collieries and for concentrating operations in modern collieries as opportunities become available in terms of productive capacity needs.[121]

The Weir report is even more explicit regarding the need for modernization in order for the company to remain a profitable enterprise:

> At the time of the Glen Alden - Lehigh and Wilkes-Barre consolidation in 1930, the funded debt of the consolidated companies was $52,500,000. By the end of

> 1940, this had been reduced to approximately $34,000,000. At the end of 1951, the amount was less than $1,000,000. The almost complete retirement of this debt during a 22 year period in a market constantly contracting except for the war years is no small achievement. However, during this 22 year period the total charges for depletion and depreciation approximated the $51,500,000 of the funded debt retired. The company's books show that approximately $17,000,000 were invested in fixed assets during the 20 year period ending December 31, 1951. This amount probably does not reflect all of the improvements made. Some part of the total cost of improvements was undoubtedly charged to cost of production currently, but it is unlikely that the total amount invested and spent on improvements exceeded an average of $1,000,000 annually for the 20 year period. Earnings after federal income taxes and interest charges were in excess of $79,000,000 during the 22 year period. It is apparent that the policy pursued was one of reduction of debt and payment of dividends, with only a small reinvestment to improve properties. We pass no judgment on whether this policy was good or bad. In view of the well-known continuing contraction of the market for anthracite, perhaps it was desirable. However, the present condition of the properties reflects the policy pursued. Present facilities are largely obsolete and in some instances poorly maintained. Even small labor-saving devices have not been purchased and put to use.[122]

In addition, the Weir report indicated the Huber Breaker was the most modern, with the lowest cost of processing, breaker of the eight operated by Glen Alden in 1952.[123]

The record shows, in the years immediately following 1952, Glen Alden initiated major administrative and organizational changes and launched a program of consolidating and refurbishing its coal processing facilities. And when Glen Alden's new president, Francis O. Case, arrived in 1953, he quickly emphasized the company's intent to proceed on a course of corporate streamlining and industrial renovation. In May 1953, Case, the former vice president of Anaconda Copper Company and president of its subsidiary, Anaconda Aluminum Company,[124] while congratulating the work accomplished by the board of directors since 1951, announced the company's future under his direction:

> With reference to the future, my objective is first to continue the building of an efficient team to carry on your company's business. I find we have an exceptionally able and interested group of directors, and a wealth of talent in your company's personnel. I believe that when the entire organization is streamlined and pulling together that you will be pleased with the results. Also I believe that it is possible to further reduce overhead and other costs and also simplify our corporate structure.[125]

With regard to continued modernization of Glen Alden's coal producing facilities, Case added:

> Engineering studies are being made in order to determine whether further modernization, elimination of high cost units, merchandising and other technical improvements will enable us to deduce the costs of mining and preparing coal for the market....
>
> ... In previous years mining methods were developed with the object of getting out large lumps of coal, the larger the better. Everything - drilling, blasting, transporting, breaker construction - everything at the colliery was based on the concept of large size coal being the source of profit.
>
> Today that concept has to be reexamined. If the use of domestic sizes of anthracite continues to decline, if the automatic stoker is to find increasing use in home heating, and if the industrial use of small size anthracite continues to rise, then we must explore ways and means of profitably producing small sizes of coal.[126]

Despite continued losses through 1953, the company began to show results in 1954 with a small earnings increase. Case demonstrated continued optimism by announcing new modernization programs throughout 1954 and, in February 1955, revealed the largest program to date, a $3,000,000 program for additional improvements in mine mechanization and breaker modernization.[127]

The technological changes introduced at the Huber colliery during these years are an integral part of the company's efforts. The refurbishing program at Huber focused primarily on the installation of new mechanical devices in the breaker's fine-coal plant which complemented, but did not eliminate, the coal cleaning and sizing equipment put on-line in 1939. In each case, the new equipment was designed to clean higher percentages of small coal to take advantage of market trends and to reduce the amount of fine-coal sent out in refuse, thereby increasing profits.

In order to accomplish these production goals, the fine-coal process underwent considerable changes throughout the 1950s. Fine-coal particles continued to be conveyed to a series of shakers which separated the various sizes, and the sized coal was directed to the fine-coal Menzies cones for cleaning. However, once the smallest coal and refuse exited the cones, it proceeded through a series of additional machines designed to clean and separate high percentages of No. 4 and No. 5 buckwheat coal. So, the fine-coal process at Huber now included No. 4 and No. 5 buckwheat launders, spiral classifiers, screen vibrators, two 12' coal classifiers, and one 8' hydrotator.[128]

In addition to the new breaker technology, a new wash house was opened in 1952. The concrete-block structure, approximately 90' x 280', featured a "smooth and durable flooring, good heating, shower rooms lined with tile, a modern ventilation system, numbered clothes baskets suspended from the ceiling, and modern lighting."[129] Retail coal pockets, connected to the breaker, were constructed in 1954 reflecting changes in transportation flow toward truck haulage and away from rail haulage.[130]

GLEN ALDEN DIVERSIFICATION AND TAKE-OVER

Glen Alden's enthusiasm for modernization of its coal facilities as indicated by the $3 million improvement program announced in February, 1955 was quelled only two months later. At the annual stockholders meeting held on April 26, 1955, president Case announced the acquisition of the Mathes Company of Fort Worth, Texas for $11,000,000 of Glen Alden assets. The company manufactured heat pumps, air conditioners, and room coolers, and the purchase represented a first step in Glen Alden's program to diversify its operations. And, in order to accommodate this expansion, the stockholders voted to change the name of Glen Alden Coal Company to Glen Alden Corporation. Concerning the coal operations, Case disclosed:

> that the management of Glen Alden could not, in the interests of its stockholders, proceed with its plans for investing a substantial amount of money in the region over and beyond its announced $3 million modernization program.[131]

He continued, placing the burden for the decision on others:

> We simply cannot afford to further invest large sums of our capital in the region unless the opportunities for doing business are greatly improved. And that must be decided by the people of Pennsylvania and their city, county, and State officials.[132]

By the end of the year, Glen Alden acquired yet another subsidiary, Ward LaFrance Truck Corporation, a leading manufacturer of fire apparatus and emergency cars.[133] The purchase of these two profitable subsidiaries, Mathes and Ward LaFrance, made the Glen Alden Corporation an attractive operation for possible take-over by other corporate interests. In 1958, List Industries, a holding company, became Glen Alden's majority stockholder. Glen Alden was now in the hands of a company which had "little proprietary interest in anthracite."[134]

THE 1960s AND THE FINAL MODIFICATION OF HUBER

Despite major difficulties arising out of a continuously shrinking market, the 1959 Knox Mine Disaster, Susquehanna river pollution, excessive mine water problems, and expensive property taxes on coal reserves, the coal division of Glen Alden Corporation under the new List management entered the 1960s with an aggressive program to improve its position. The program included strategies for revision of its sales organization; strengthening the operating department; a renewed research effort; strengthening community relations, which included a major promotion in 1962, "Anthracite Silver Dollar Week"; and continued modernization of equipment, involving a major modification of the Huber Breaker in 1963.[135]

Desiring to capture a European market for anthracite in Holland, France, and Belgium and supply U.S. Army installations in Germany with premium anthracite, Glen Alden thoroughly remodeled the fine-coal plant at Huber and installed a heavy-media system in the coarse-coal section to recover middlings. The remodeling was necessary to adequately separate the popular smaller sizes from an ever increasing amount of refuse brought to the breaker from surface, strip and lower quality, underground mining operations.

For years, coal produced by underground, manual mining methods reached the surface with many seam impurities discarded at the face, and, as a result, could be cleaned acceptably by mechanical means using upward currents of water to separate lighter coal from the heavier refuse. This, of course, was the method used at Huber since 1939. However, as the best underground coal seams diminished and underground mining became more expensive due to excessive water, the anthracite industry became increasingly dependent on strip mining. Stripped coal often contained 40-80 percent rock and other refuse so finely dispersed that conventional cleaning methods were unsatisfactory. Confronted by these difficult cleaning problems, the industry experimented for decades, based on European models, with so-called heavy-media systems which employed heavier-than-water liquids or suspensions of finely ground, dense solids to separate the coal from the refuse.[136]

The 1963 Huber program, completed through a $1,000,000 contract with Wilmot Engineering Company, White Haven, Pennsylvania, entailed the replacement of nine Menzies cones with five heavy-media systems. The five units included two Wilmot OCC vessels to handle pea and buckwheat sizes, a similar vessel to recover middlings or prepare premium egg, stove, and nut coal. Two systems for rice and barley were the first commercial installation of new technology, Wilmot's Dyna Whirlpool Process. In addition, the system included a froth-flotation circuit used to salvage No. 6 buckwheat from sludge. Media used were magnetite and kerosene.[137]

The Dyna Whirlpool Process consisted of newly designed separation vessels coupled with conventional medium-recovery equipment. The Dyna Whirlpool Process was described by Coal Age and the Wilmot Engineering Company:

> The Dyna Whirlpool separatory vessel consists of a straight-walled cylinder of predetermined length and diameter which is equipped with a media inlet and product outlet head and a feed inlet and refuse outlet head. The raw-coal feed enters at top of vessel through a feed pipe, with the magnetic media entering tangentially under pressure at the bottom of the vessel. The pumped media rises to the top of vessel and creates an open vortex whereupon a proportion of it leaves the vessel through the refuse discharge pipe at a high specific gravity. The remaining media reverses direction towards the inner core of the whirling media bath and discharges through the float discharge pipe at a lower specific gravity. The actual separation takes place on the inner face of the vortex in such a manner

that the light float coal rides downward to be discharged as clean coal through the product discharge pipe. The heavy media refuse particles of the feed penetrate the rising media towards the outer wall of the unit and are discharged with the high gravity medium through the refuse discharge pipe.

There is a gravity differential between the float clean coal product media and the sink refuse media. This is brought about by a gravity differential inside the vessel itself which increases upward with the rising media, reaching its maximum at the refuse discharge pipe. The gravity also increases in the direction from the inner face of the vortex towards the outer wall of the vessel due to centrifugal force.[138]

The Dyna Whirlpool units were made of "seamless steel tubing with case hardened inner surfaces." The six Huber units had an inside diameter of 15"-1\2". Each had a capacity of up to 50 tons per hour (tph). Coal Age indicated the new heavy-media systems at Huber resulted in an increase of 50 tph in the pea, buckwheat, rice, and barley sizes. The froth-flotation unit separated 18-20 tph of buckwheat No. 6.[139] The effectiveness of the new system, particularly the Dyna Whirlpool Process, was described by George Cashaunas, Huber's Breaker foreman. He indicated that for years the refuse at Huber contained at least "15 percent good coal." After the installation of the Dyna Whirlpool Process, however, samples taken from the Huber refuse banks indicated a .05 per cent content of "good coal." These results meant, according to Cashaunas, the recovery of approximately 15 tons of coal for every 100 tons of refuse; a rate at which the new equipment "paid for itself in no time."[140]

EPILOGUE

No amount of technological innovation could have saved Glen Alden and its Huber facility from the corporate financial entanglements which shortly followed the final modernization of the Huber Breaker. Beginning in 1966, Glen Alden's coal operations became embroiled in a bewildering series of corporate manipulations featuring leveraged buy-outs, fraudulent conveyances, tax delinquencies, and finally bankruptcy. The story rivals the more recent Wall Street scandals of the 1980s. These corporate "battles" involved a number of figures prominent in the anthracite industry in northeastern Pennsylvania, as well as a nationally recognized figure, James Riddle Hoffa, Jr., President of the International Brotherhood of Teamsters. The tale is a labyrinth of deals which deserves serious historical investigation in the future. However, only a very brief outline of events will be included here as the closing chapter of the Huber colliery's history.

In 1966, Glen Alden Corporation sold its subsidiary, the Blue Coal Corporation, to Raymond Colliery for $6 million. Raymond Colliery, incorporated in 1962, was owned by two families, the Gillens and the Clevelands, and controlled over 30,000 acres of land in Luzerne and Lackawanna counties in Pennsylvania. Raymond was one of the largest anthracite coal producers in the country. By 1971, Raymond experienced financial problems, and its shareholders agreed to sell the company to James Durkin, Raymond's president, on February 2, 1972.[141]

Durkin had difficulty securing the necessary finances to consummate the deal. He sought assistance from the Central States Pension Fund of the International Brotherhood of Teamsters and other sources, creating the Great American Corporation to effect the buy out. Fifty percent of Great American was actually owned by James R. Hoffa, Jr., who remained a secret partner until his disappearance.

In November, 1973, the Great American purchase of Raymond was finalized through loans and stock option deals. Shortly thereafter, Raymond's financial conditioned worsened. And, within two months of the closing, the deep mining operations were shut down. Six months later, all strip mining operations ceased.[142]

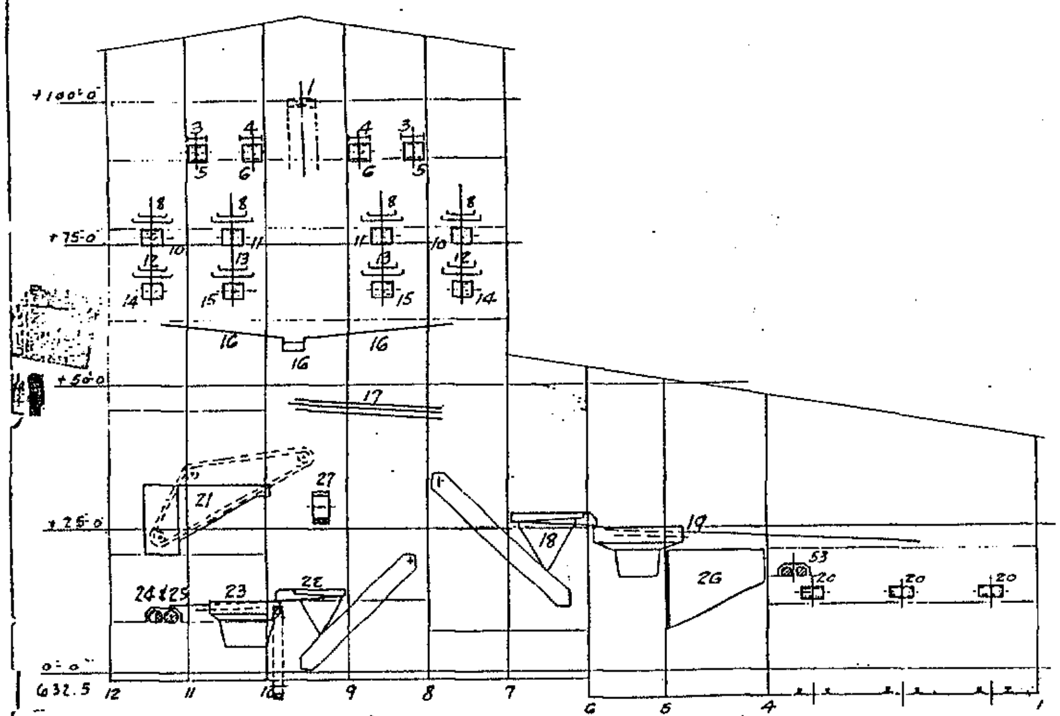
Between 1974 and 1976, "new dramatis personae" appeared and "orchestrated additional financial dealings." These included James J. Tedesco, president of the Old Forge Bank, Pagnotti Enterprises and Lucky Strike Coal Company, both large anthracite producers. Suits against Great American related to its "Blue Coal holdings" began to pile up, including those initiated by the Commonwealth of Pennsylvania and the Anthracite Health and Wealth Fund. Both Luzerne and Lackawanna counties pursued the company for payment of delinquent taxes. On December 17, 1976, at a Luzerne county tax sale, John Doran, Esq., announced he had filed an involuntary bankruptcy petition against Blue Coal on behalf of its creditors.[143]

In the midst of this myriad of financial and legal entanglements, portions of the Blue Coal lands were leased to the Lucky Strike Coal Company, owned by Louis Beltrami; on June 18, 1975, the land and improvements of the Huber operations in Ashley, Pennsylvania were sold to Beltrami.[144] Mr. Beltrami operated the Huber Breaker for a short time, processing coal from several strip mining operations. In 1976, the last coal flowed through the breaker. With its unceremonial closing, a industrial facility, significant for its architectural, technological, and industrial history, ceased operation. The legal questions, which surrounded the facility and the corporation which owned it in its final years, remain unsettled.

APPENDIX

Reduced Copies of Drawings

Glen Alden Coal Company Mechanical Engineers, Huber Breaker Diagrammatic Flow Sheets: Plans, Sections, and Equipment Location, 1939, Sheets 1-9.



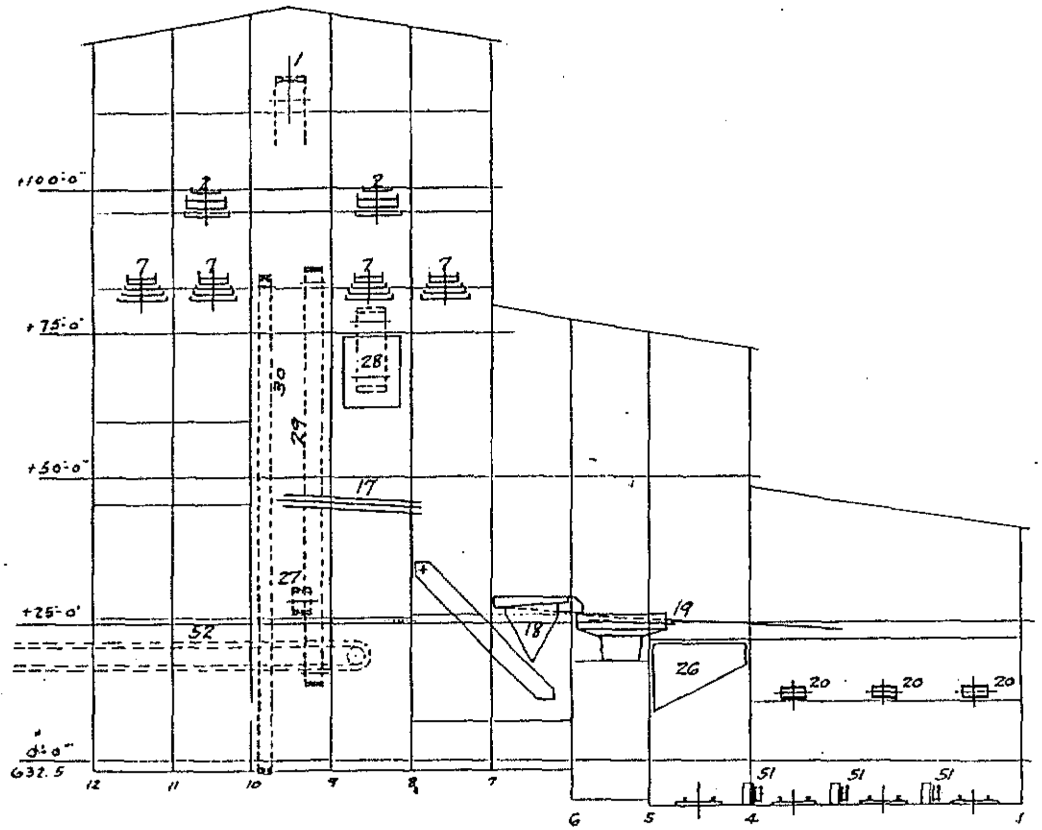
SIDE ELEVATION - SECTION A to E.

	DESCRIPTION
1	Main conveyor. 10"×60" flights. 110 ft/min.
3	Lump picking shakers.
4	Steamer " "
5	" rolls. 32"×38"
6	Egg " 32"×42"
8	Grate & egg shakers.
10	Egg rolls. 32"×42"
11	Stove " 32"×42"
12	Egg shakers.
13	Stove "
14	Stove rolls. 32"×42"
15	Nut " 32"×42"
16	Shaking chutes, feeding main screens.
17	Shakers. E, S & N.
18	Menzies cones. E. S & N. 9'4" Diam.
19	Dewatering shakers.
20	Boom loaders. 48" belt.
21	Lower fine coal settling tank.
22	Tailings cones. 7'0" Diam.
23	Dewatering shakers.
24	Pea coal rolls. 15½"×30"
25	Nut " " 24"×36"
26	Retail coal pockets. E. S & N.
27	Lower fine coal conveyor. 8"×36"
53	Nut rolls. 15½"×15"

1 of 9

FLOW SHEET
HUBER BREAKER.
GLEN ALDEN COAL CO.
MECHANICAL ENGINEERS.
1"=20'
11-13-39.
J.T.H.

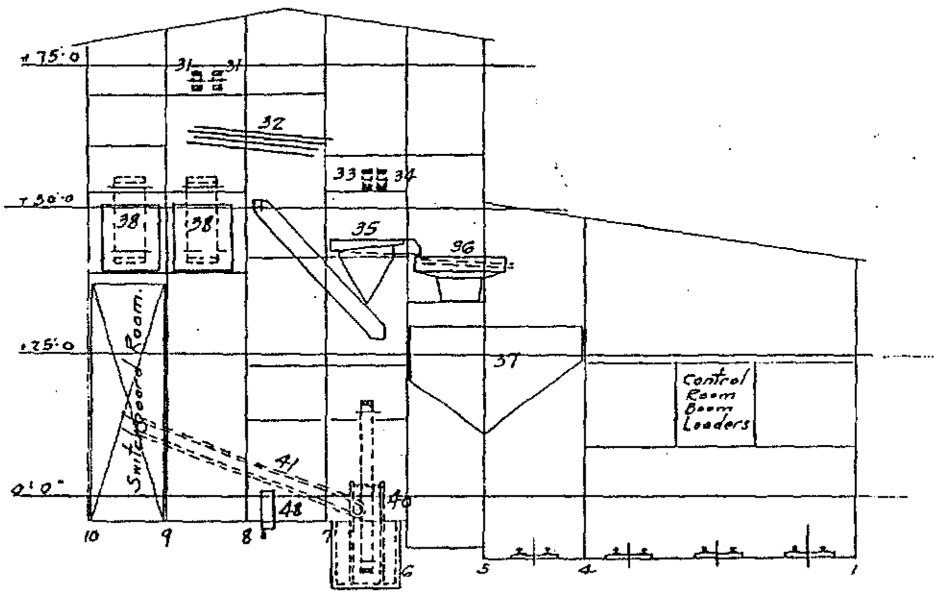
	DESCRIPTION
1	Main conveyor. 10"x60" flights. 110 ft. per min.
2	Lump & steamer shakers.
7	Grate, egg, stove & nut shakers.
17	Shakers. E.S & N.
18	Menzies cones. E.S & N. 9'-4" Diam.
19	Dewatering shakers.
20	Boom loaders. E.S & N. 48" belt.
26	Retail pockets. E.S & N.
27	Lower fine coal conveyor. 8"x36"
28	Upper fine coal settling tank.
29	Fine coal elevator. 15"x22"x30".
30	Screenings & boney elevator. 10"x18"x15".
51	Car movers.
52	Fuel conveyor to storage bins.



SIDE ELEVATION - SECTIONS E to H.

2 of 9

FLOW SHEET
HUBER BREAKER.
GLEN ALDEN COAL CO.
MECHANICAL ENGINEERS.
1" = 20'
11-13-39.
J. T. H.

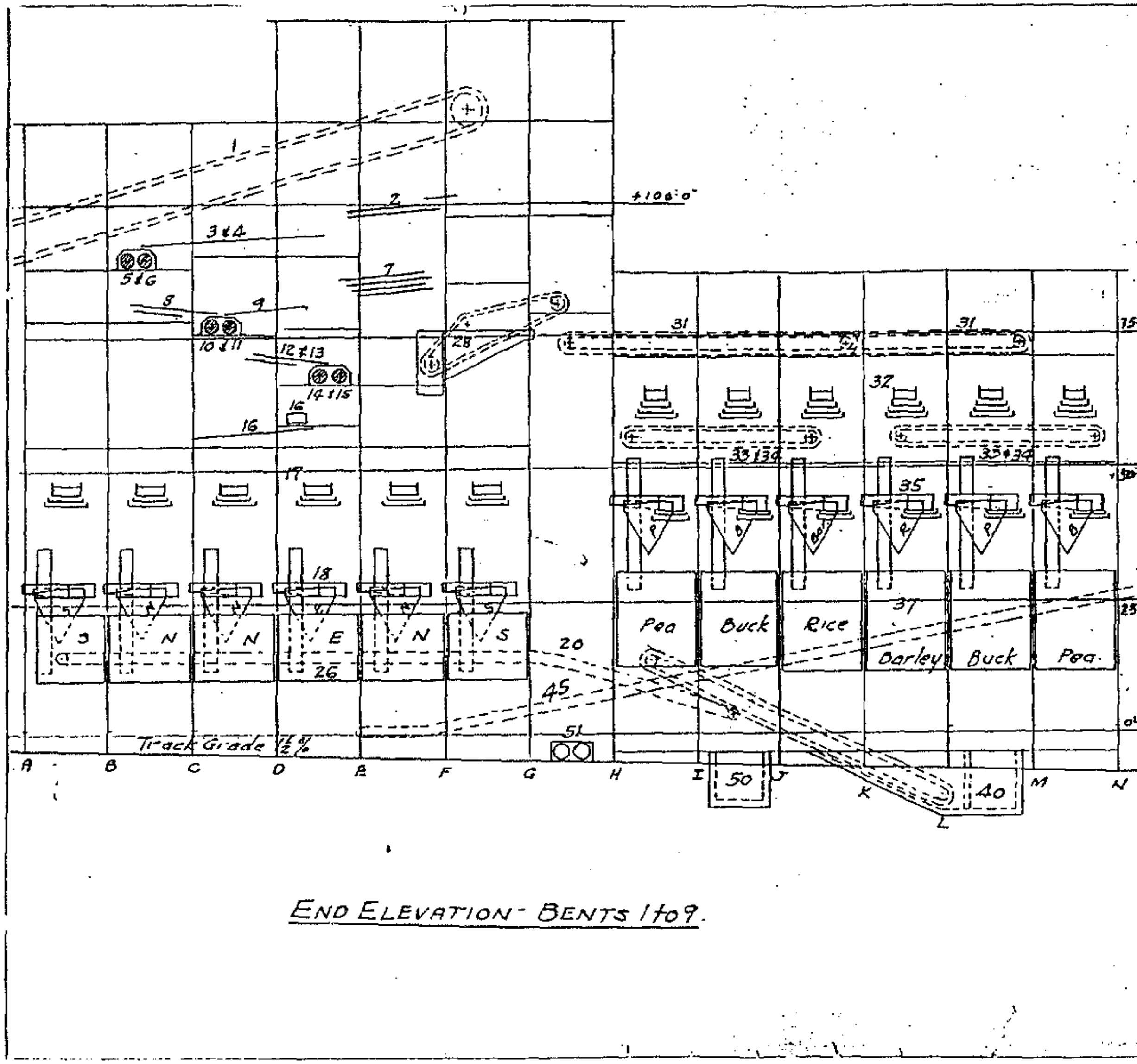


SIDE ELEVATIONS - SECTIONS H to N.

	DESCRIPTION
31	Upper fine coal conveyors. 8"×36".
32	Shakers. P.B.R & B.
33	Barley conveyors. 5"×15".
34	Rice " . 5"×15".
35	Menzies cones. P.B.R & B. 9'4" Diam.
36	Dewatering shakers.
37	Pockets. P.B.R & B.
38	#2 Barley, settling tanks. 8"×60".
40	Drip water settling tank.
41	Screenings conveyor. 7"×15".
48	Lime feeder.

3 of 9

FLOW SHEET
HUBER BREAKER
GLEN ALDEN COAL CO.
MECHANICAL ENGINEERS.
1"=20'
9-13-39
J.T.H.

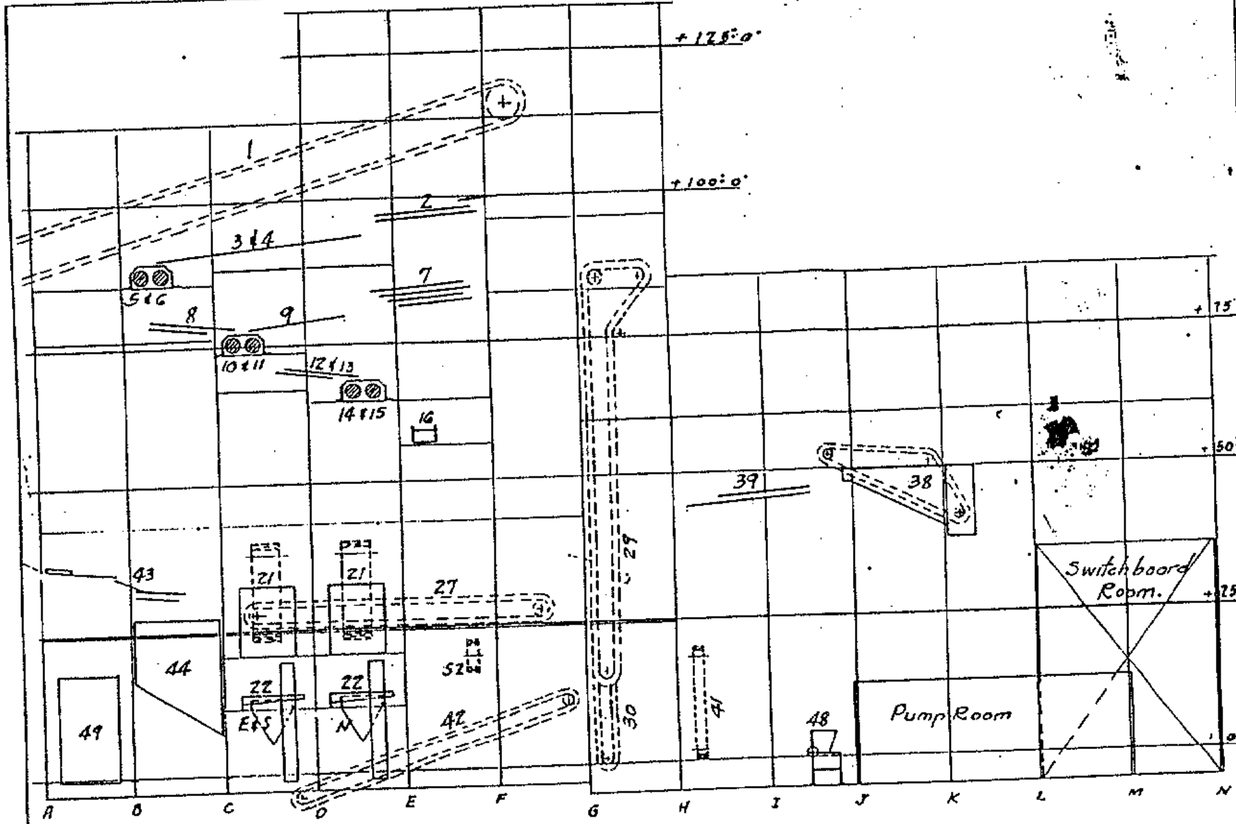


	DESCRIPTION.
1	Main conveyor. 10'·60' flights 110 ft/min.
2	Lump & steamer shakers.
3	" picking tables.
4	Steamer " "
5	Steamer rolls. 32"·38".
6	Egg " 32"·42".
7	Grate, egg, stove & nut shakers.
8	" & " shakers.
9	Grate picking shakers.
10	Egg rolls. 32"×42".
11	Stove " 32"×42".
12	Egg shakers.
13	Stove "
14	Stove rolls. 32"·42".
15	Nut " 32"·42".
16	Shaking chutes, feeding main screens
17	Main screens. E, S & N.
18	Menzies cones. E.S.&N. 9'4" Diam.
20	Boom loaders. E.S.N. 48" belt.
26	Pockets. E, S & N.
28	Upper fine coal settling tank.
31	" " " conveyors. 8"·36"
32	Shakers. P.B.R & B.
33	Barley conveyor. 5"·15".
34	Rice " 5"·15".
35	Menzies cones. P.B.R & B. 9'4" Diam.
37	Pockets. P.B.R & B.
40	Drip water settling tank.
45	Refuse conveyor. 30" belt.
50	Make-up pump sump.
51	Car movers.

4 of 9

END ELEVATION - BENTS 1 to 9.

FLOW SHEET
HUBER BREAKER.
GLEN ALDEN COAL CO.
MECHANICAL ENGINEERS.
1" = 20'
11-15-39
J.T.H.



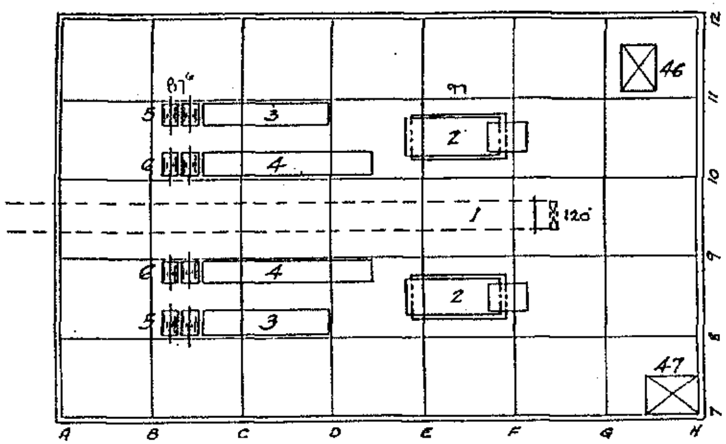
END ELEVATION - BENTS 9 to 12.

DESCRIPTION	
1	Main conveyor. 10"·60' flights. 110 ft/min.
2	Lump & steamer shakers.
3	" " " picking tables.
4	" " " " " .
5	Steamer rolls. 32"×38".
6	Egg " 32"×42"
7	Grate, egg, stove & nut shakers.
8	" & " shakers.
9	Grate picking shakers.
10	Egg rolls. 32"×42".
11	Stove " 32"×42".
12	Egg shakers.
13	Stove " .
14	Stove rolls. 32"×42".
15	Nut " . 32"×42".
16	Shaking chute, feeding main screens.
21	Lower fine coal settling tanks.
22	Tailings cones. 7'-0" Diam.
27	Lower fine coal conveyor. 8"·36'.
29	Fine coal elevator. 15"·22"·90'.
30	Screenings & boney elevator. 10×18"·18'.
38	#2 barley settling tanks. 8"·60'.
39	#2 " shaking screens.
41	Screenings conveyor. 7"·15'.
42	Boney conveyor. 7"·15'.
43	Mine rock shakers.
44	Pocket for mine rock fines.
48	Lime feeder.
49	Coloring tanks. Storage.
52	Fuel conveyor to storage bins.

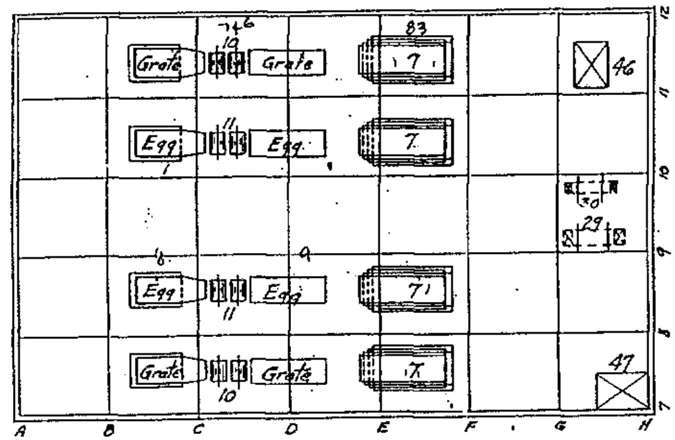
5 of 9

FLOW SHEET
HUBER BREAKER.
GLEN ALDEN COAL CO.
MECHANICAL ENGINEERS.

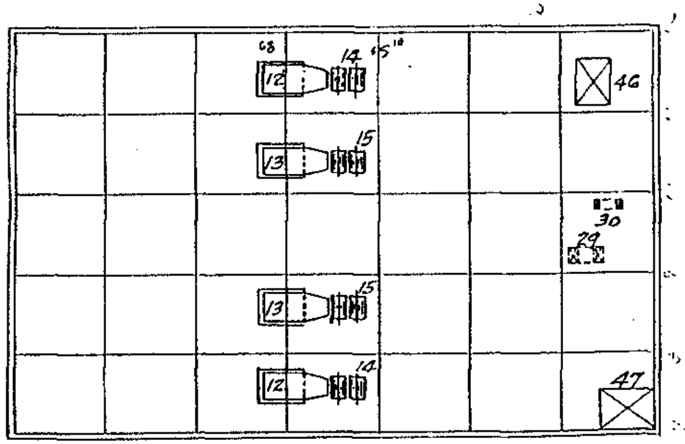
1" = 20'
11-15-39
J.T.H.



PLAN AT MAIN CONVEYOR, BULL SHAKERS & LUMP & STEAMER PLATFORMS.



PLAN AT MINE RUN SHAKERS & EGG & STOVE ROLLS.

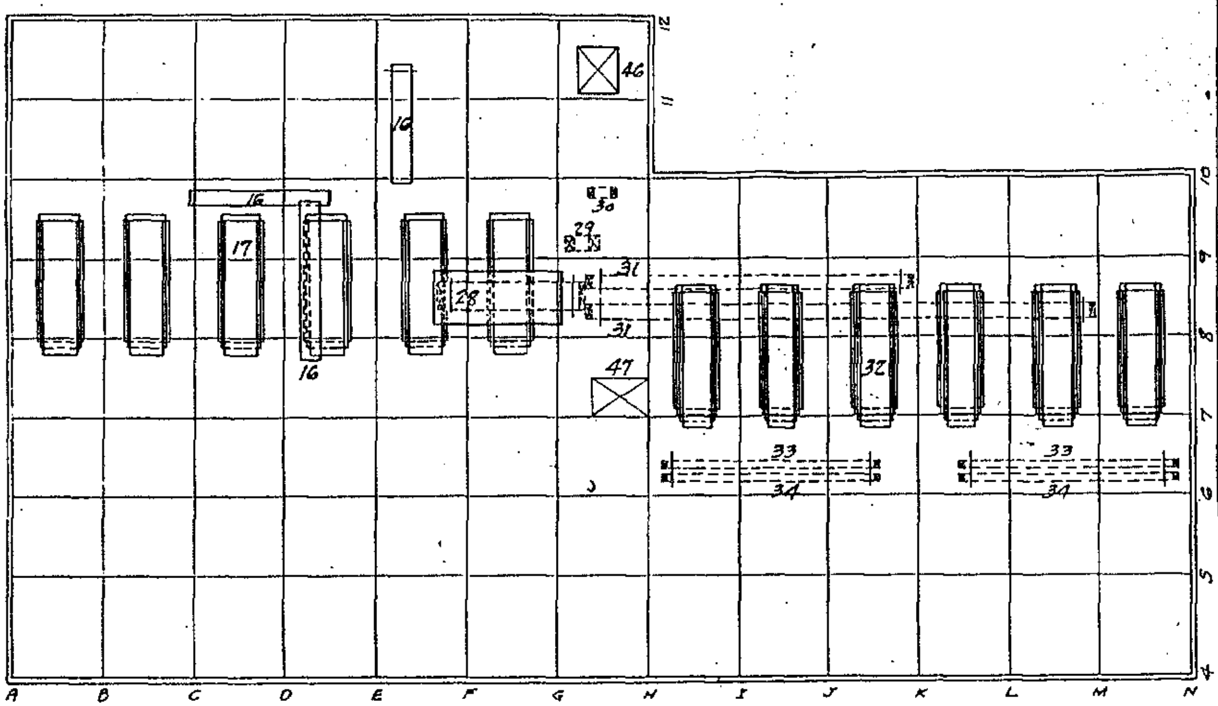


PLAN AT STOVE & NUT ROLLS.

	DESCRIPTION.
1	Main conveyor. 10"x60" flights. 110 ft/min
2	Lump & steamer shakers.
3	Lump picking shaker.
4	Steamer " " .
5	" rolls. 32"x38"
6	Egg rolls. 32"x42".
7	Grate, egg, stove & nut shakers.
8	Grate & egg shakers.
9	Picking shakers.
10	Egg rolls. 32"x42".
11	Stove " 32"x42".
12	Egg shakers.
13	Stove " .
14	Stove rolls. 32"x42".
15	Nut " . 32"x42".
29	Fine coal elevator. Pea & smaller.
30	Screenings & boney elevator. 10"x18"x15.
46	Elevator. Freight & passenger.
47	Hoistway.

6 of 9

FLOW SHEET
HUBER BREAKER.
GLEN ALDEN COAL CO.
MECHANICAL ENGINEERS.
1" = 20'
11-15-39
J.T.H.

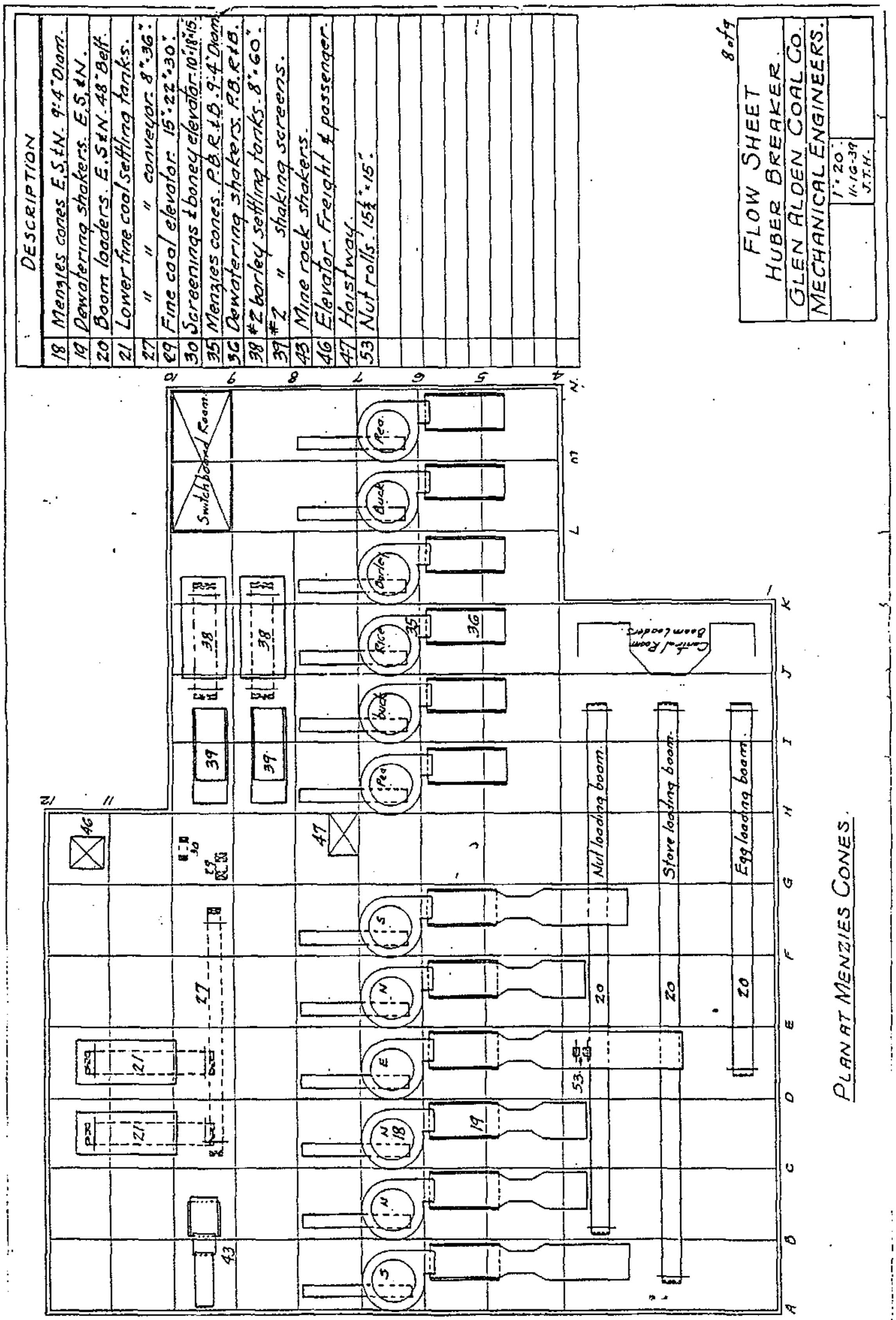


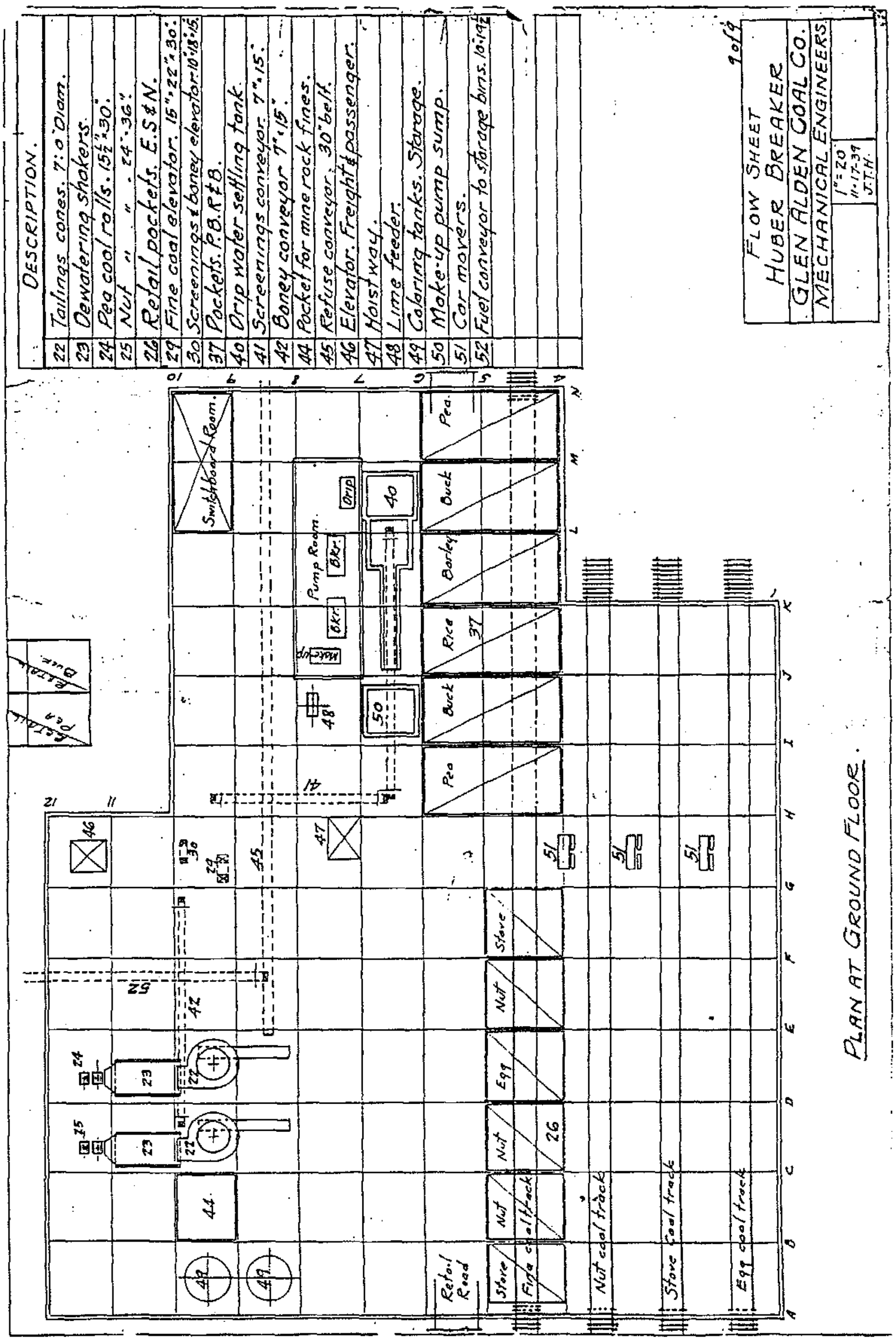
PLAN AT SHAKERS.

	DESCRIPTION
16	Shaking chutes feeding main screens.
17	Shakers. E.S.&N.
28	Upper fine coal settling tank.
29	Fine coal elevator. 15"•22"•30"
30	Screenings & boney elevator. 10"•18"•15.
31	Upper fine coal conveyors. 8"•36".
32	Shakers. P.B.R.&B.
33	Barley conveyors 5"•15."
34	Rice " 5"•15."
46	Elevator. Freight & passenger.
47	Hoistway.

7 of 9

FLOW SHEET
HUBER BREAKER
GLEN ALDEN COAL CO.
MECHANICAL ENGINEERS.
1" = 20'
11-15-39
J.T.H.


DESCRIPTION
18 Menzies cones E.S.&N. 9'-4" Diam.
19 Dewatering shakers. E.S.&N.
20 Boom loaders. E.S.&N. 48" Belt.
21 Lower fine coal settling tanks.
27 " " " conveyor. 8"-36".
29 Fine coal elevator. 15"-22"-30'.
30 Screenings & boney elevator. 10"-18"-15'
35 Menzies cones. P.B.R.&B. 9'-4" Diam.
36 Dewatering shakers. P.B.R.&B.
38 #2 barley settling tanks. 8"-60".
39 #2 " shaking screens.
43 Mine rock shakers.
46 Elevator. Freight & passenger.
47 Hoistway.
53 Nut rolls. 15½"×15".
8 of 9
FLOW SHEET
HUBER BREAKER.
GLEN ALDEN COAL CO.
MECHANICAL ENGINEERS.
1"=20'
11-16-39
J.T.H.
Switchboard Room
Pea
Buck
Barley
Rice
Central Room Boom Loaders
Nut loading boom
Stove loading boom
Egg loading boom
PLAN AT MENZIES CONES.


DESCRIPTION.
22 Tailings cones. 7'-0" Diam.
23 Dewatering shakers.
24 Pea coal rolls. 15½"-30".
25 Nut " " . 24"-36".
26 Retail pockets. E.S.&N.
29 Fine coal elevator. 15"-22"-30".
30 Screenings & boney elevator. 10"-18"-15.
37 Pockets. P.B.R.&B.
40 Drip water settling tank.
41 Screenings conveyor. 7"-15".
42 Boney conveyor 7"-15".
44 Pocket for mine rock fines.
45 Refuse conveyor. 30" belt.
46 Elevator. Freight & passenger.
47 Hoistway.
48 Lime feeder.
49 Coloring tanks. Storage.
50 Make-up pump sump.
51 Car movers.
52 Fuel conveyor to storage bins. 10"-19½
9 of 9
FLOW SHEET
HUBER BREAKER
GLEN ALDEN COAL CO.
MECHANICAL ENGINEERS.
1" = 20'
11-17-39
J.T.H.
Switchboard Room.
Pump Room.
Make-up
Bkr.
Bkr.
Drip
Pea
Buck
Rice
Barley
Buck
Pea
Retail Road
Store
Nut
Nut
Egg
Nut
Stove
Fine coal track
Nut coal track
Stove coal track
Egg coal track
Retail Pea
Retail Buck
PLAN AT GROUND FLOOR.

ENDNOTES

1. R. Dawson Hall, "Huber Central Breaker," Coal Age 44, (April 1939): 68.

2. "Anthracite Mines Make Modest Technical Gains," Coal Age 44, (February 1939): 43.

3. Hall, "Huber Central Breaker," 68.

4. Ibid., 70.

5. R. Dawson Hall, "First Aerial Disposal Plant," Coal Age 44, (August 1939): 32.; R. Dawson Hall, "Huber Power House," Coal Age 44, (May 1939): 37-38.; "Anthracite Industry With Prospects of Renewed Vigor Rises From the Ashes of Near Bankruptcy," Coal Age 45, (February 1940): 52.

6. Hall, "Huber Central Breaker," 70.; Annie Bohlin, "Nomination of the Ashley Planes to the Pennsylvania Inventory of Historic Places," May 1979, Special Collections, Wyoming Historical and Geological Society, Wilkes-Barre, Pa., 11-12.

7. See Index to Photographs for this report (Huber Coal Breaker, HAER No. PA-204), Photograph Nos. PA-204-19 and 51.

8. "Glen Alden Tools Up for Higher Efficiency and Market Growth," Coal Age, (March 1963): 82-83.

9. International Library of Technology, Surface Arrangements at Bituminous Mines, Coal Washing, Principles of Coking, Coking in the Beehive Oven, By-Product Coking, Surface Arrangements at Anthracite Mines, Preparation of Anthracite (Scranton: International Textbook Company 1907), 73.1.

10. For example see: D.L. Miller and R.E. Sharpless, The Kingdom of Coal: Work, Enterprise, and Ethnic Communities in the Mine Fields (Philadelphia: University of Pennsylvania Press 1985); A.F.C. Wallace, St. Clair: A Nineteenth-Century Coal Town's Experience with a Disaster-Prone Industry (New York: Alfred A. Knopf 1987); The Hudson Coal Company, The Story of Anthracite (New York: The Hudson Coal Company 1932); H.M. Chance, Report on the Mining Methods and Appliances Used in the Anthracite Coal Fields (Harrisburg: Second Geological Survey of Pennsylvania 1883); International Correspondence Schools, The Elements of Mining: Shafts, Slopes, and Drifts; Methods of Working; Mine Surveying; Mine Machinery (Scranton: The Colliery Engineering Company 1897).

11. International Library of Technology, Surface Arrangements, 73.1.

12. Chance, Report on Mining Methods, 105A.C.

13. Wallace, St. Clair, 33.

14. Chance, Report on Mining Methods, 457A.C.

15. H.W. Decker, Jr. and J.N. Hoffman, Coal Preparation (University Park: The Pennsylvania State University 1963), 80.

16. "Mine-run" or run-of-the-mine" are phrases used in the anthracite industry to describe coal before it is sized or cleaned.

17. Chance, Report on Mining Methods, 443A.C.; International Library of Technology, Surface Arrangements, 74.1.

18. "Preparation," Coal Age 41, (October 1936): 430.

19. Wallace, St. Clair, 33.

20. Edward Pinkowski, "Joseph Batten: Father of the Coal Breaker," The Pennsylvania Magazine of History and Biography 73, (July 1949): 340.

21. Ibid., 339.

22. Ibid., 340-341; Wallace, St. Clair, 34.

23. Chance, Report on Mining Methods, 458A.C.; International Library of Technology, Surface Arrangements, 74.11.

24. Chance, Report on Mining Methods, 458A.C.

25. International Library of Technology, Surface Arrangements, 74.11.

26. Wallace, St. Clair, 28, 36.

27. International Library of Technology, Surface Arrangements, 74.10.

28. Wallace, St. Clair, 36.

29. Chance, Report on Mining Methods, 459A.C.; International Library of Technology, Surface Arrangements, 74.14-74.19; 74.21-74.22.

30. D.L.&W.R.R. Glass Plate Negative, A1106, Delaware, Lackawanna, and Western Railroad Collection, George Arents Research Library at Syracuse University, Syracuse, New York; D.L.&W.R.R. Glass Plate Negative, A1167, Delaware, Lackawanna, and Western Railroad Collection, George Arents Research Library at Syracuse University, Syracuse, New York.

31. F.K. Brewster, "Buildings and Breaker of the New Loomis Colliery," Coal Age 6, (November 21, 1914): 816-819.

32. D.L.&W.R.R. Glass Plate Negative, A1372, Delaware, Lackawanna, and Western Railroad Collection, George Arents Research Library at Syracuse University, Syracuse, New York.

33. John S. Johnson, "Autobiography of A World's Record Breaker Builder," (manuscript photocopy), ca. 1953, Hugh Moore Museum Archives, Hugh Moore Museum, Easton, Pa.; Dorothy Allen Silva, "Marvine Colliery, HAER No. PA-183," (Historical Report Photocopy), April 1990, Library, Anthracite Museum, Scranton, Pa., 6.

34. Borough of Ashley, Pa., Ashley Area Centennial 70(Ashley: Ashley Borough, 1970).

35. Pa. Department of Internal Affairs, Reports of the Inspector of Mines of Pennsylvania, 1895 (Harrisburg: State Printer of Pa., 1896), 98.

36. Hall, "Huber Central Breaker," 68; "Glen Alden Coal Co. to Build," New York Times, 14 July 1938.

37. See Index to Photographs for this report (Huber Coal Breaker, HAER No. PA-204), Photograph Nos. PA-204-19, 46, and 49.

38. All references to engineering drawings are to the original drawings found in the Blue Coal archives by the HAER team. The early drawings refer to the "Maxwell Colliery", which is the correct reference since the re-naming of the colliery and breaker did not take place until the construction was completed.
Glen Alden Coal Company Engineering Drawing, J502, 3-18-37, Blue Coal Archives, Blue Coal Office, Ashley, Pa., photocopied by HAER. (Hereinafter all engineering drawings cited as Drawing, Number, Date(if any), G.A.C.C.).

39. Drawing, J507, 12-11-37, G.A.C.C.; Drawing, J505, 12-11-37, G.A.C.C.; Drawing, J508, 12-11-37, G.A.C.C.; Drawing, J506, 12-11-37, G.A.C.C.

40. Ibid.

41. For a more complete discussion of the "International Style" and its relationship to turn of the century North American industrial architecture, see: Reyner Banham, A Concrete Atlantis: U.S. Industrial Building and European Architecture, 1900-1925 (Cambridge: The MIT Press, 1989).

42. Henry-Russell Hitchcock and Philip Johnson, The International Style (New York: W.W. Norton & Company, 1966), vii; Peter Blake, The Master Builders: Le Corbusier, Mies van der Rohe, Frank Lloyd Wright (New York: W.W. Norton & Company, 1976), 96, 227.

43. Hitchcock and Johnson, The International Style , 13.

44. Ibid., 109-179.

45. Ibid., 109.

46. The concept of the breaker as a "giant machine" was suggested in a letter to Ms. Robbyn L. Jackson, Washington, D.C. from Richard K. Anderson, Jr., Columbia, S.C., 30 May 1991. A photocopy of the original letter is in the author's possession.

47. See, for example, Chance, Report on Mining Methods; Hall, "Huber Central Breaker"; "Anthracite Breaker With Fresh-Water Cone and Large Pockets for Retail Trade," Coal Age 41, (March 1936): 97-100; David R. Mitchell, "Modern Anthracite Preparation," Mechanization 4, (August 1940): 33-36; and many others.

48. Bantham, Concrete Atlantis, 23-24, 182-194.

49. Blake, The Master Builders, 21.

50. Ibid., 225, 236-237.

51. See Index to Photographs for this report (Huber Coal Breaker, HAER No. PA-204), Photograph Nos. PA-204-46 and 50; John Jones, "Huber Breaker and Heavy Machinery", (ca. 1965), collection of John Jones, Ashley, Pa., 8 mm film.

52. See Index to Photographs for this report (Huber Coal Breaker, HAER No. PA-204), Photograph Nos. PA-204-15, 25, and 41-43.

53. Glen Alden Coal Company Mining Engineering Department, Physical Assets of the Glen Alden Coal Company: Maps Showing Buildings and Structures at all Collieries and Plants (Wilkes-Barre, Pa: Glen Alden Coal Company, 1949), Blue Coal Archives, Blue Coal Office, Ashley, Pa., Sheet 8; R. Dawson Hall, "First Aerial Disposal Plant," Coal Age 44, (August 1939): 32.

54. Glen Alden Coal Company, Physical Assets, Sheet 8.

55. See Measured Drawings for this report (Huber Coal Breaker, HAER No. PA-204), "Huber Colliery Operations 1939", Drawing No. 3 of 7. See also the Engineering Drawing list for the Measured Drawing, "Huber Colliery Operations 1939", included in the HAER-PA-204 arehitect's field records.

56. It should be noted that, since large quantities of power were consumed at anthracite collieries, the major companies generated most of their own power. Central power plants produced both steam and electricity for various operations underground and on the surface. The

electricity was generated by steam turbines and distributed over transmission lines to various collieries. (See: The Hudson Coal Company, The Story of Anthracite (New York: The Hudson Coal Company, 1932): 211-214.)

57. R. Dawson Hall, "Huber Power House Establishes New Standards in Colliery Steam Rising," Coal Age 44, (May 1939): 37.

58. See Drawing, J440, 8-8-36, G.A.C.C.; Drawing, J438, 8-8-36, G.A.C.C.

59. See Index to Photographs for this report (Huber Coal Breaker, HAER No. PA-204), Photograph Nos. PA-204-32 and 36. See also Drawing, R661, 9-27-38, G.A.C.C..

60. Hall, "Huber Power House", 38.

61. Commonwealth of Pa., Department of Mines and Mineral Industries-Annual Reports, 1939-1949, Anthracite Division (Harrisburg: State Printer of Pa., 1940-1950). Figures tallied by the author.

62. Hall, "Huber Power House", 37-38.

63. See Index to Photographs for this report (Huber Coal Breaker, HAER No. PA-204), Photograph No. PA-204-42. See also Drawing, J660, 6-7-39, G.A.C.C.

64. Drawing, S1340, 6-7-39, G.A.C.C.

65. George Cashaunas, "Breaker Walkthrough: A description of the Huber Breaker Machinery and Operations by George Cashaunas," interview by HAER Team, Tape Recording, Ashley, Pennsylvania, 7 June 1991.

66. Hudson Coal Company, Story of Anthracite, 217; Commonwealth of Pa., Reports of Anthracite, 1939-1949. (Figures tallied by the author.)

67. Drawing, R661, 6-4-38, G.A.C.C.; Drawing, R662, 6-4-38, G.A.C.C.

68. Glen Alden Coal Company, Physical Assets, Sheet 8; Drawing, R682, 1-16-38, G.A.C.C.

69. Hudson Coal Company, Story of Anthracite, 150, 217-218; The Mining and Preparation of Blue Coal, 16mm film, 12 min., (ca. 1940s), distributed by the Delaware, Lackawanna, and Western Coal Company.

70. Wallace, St. Clair, 27.

71. Ibid.

72. EBASCO Services, Inc., "Anthracite Business Study prepared for Glen Alden Coal Company" (bound manuscript), July 1952, Blue Coal Archives, Blue Coal Office, Ashley, Pa., Exhibit 4.

73. Ibid., Exhibit 1, page I.

74. Ibid., 17.

75. Commonwealth of Pa., Reports of Anthracite, 1955, 45.

76. Commonwealth of Pa., Reports of Anthracite, 1949, 19; Paul Weir Company, "Report on Operations of Glen Alden Coal Company," (loose-leaf manuscript), July 1952, Blue Coal Archives, Blue Coal Office, Ashley, Pa., 22-24.

77. Drawing, J608, 4-28-38, G.A.C.C.; Drawing, R635, 8-16-38, G.A.C.C.; Drawing, R636, 7-22-38, G.A.C.C.; See Index to Photographs for this report (Huber Coal Breaker, HAER No. PA-204), Photograph Nos. PA-204-13, 15, 16, and 18. See also Index to Photographs for Huber Coal Breaker, Foothouse (HAER No. PA-204-C), Photograph Nos. PA-204-C-1 through C-4.

78. Drawing, J613, no date, G.A.C.C.; Drawing, R645, 8-14-38, G.A.C.C.; Drawing J601, 4-5-38, G.A.C.C.; Drawing J602, 4-5-38, G.A.C.C.; See also Index to Photographs for this report (Huber Coal Breaker, HAER No. PA-204), Photographs Nos. PA-204-51 and 52.

79. Drawing, J608, 4-28-38, G.A.C.C. See Index to Photographs for this report (Huber Coal Breaker, HAER No. PA-204), Photograph No. PA-204-14.

80. See Index to Photographs for this report (Huber Coal Breaker, HAER No. PA-204), Photographs No. PA-204-62.

81. Hall, "Huber Central Breaker," 69; For details regarding the main conveyor, see: Drawing, J520, 8-3-37, G.A.C.C.; Drawing, J521, 8-3-37, G.A.C.C; Drawing, J522, 8-3-37, G.A.C.C.; Drawing, J600, 10-20-37, G.A.C.C.; Drawing, J606, 4-28-38, G.A.C.C.; Jones, "Huber Breaker and Heavy Machinery," 8 mm film. See Index to Photographs for this report (Huber Coal Breaker, HAER No. PA-204), Photographs Nos. PA-204-13, 17, 18, and 27. See also Index to Photographs for Huber Coal Breaker, Breaker (HAER No. PA-204-A), Photograph Nos. PA-204-A-8 through A-10.

82. Hall, "Huber Central Breaker," 69; Jones, "Huber Breaker and Heavy Machinery," 8 mm film. See also Index to Photographs for Huber Coal Breaker, Breaker (HAER No. PA-204-A), Photograph Nos. PA-204-A-9 and 10.

83. Hall, "Huber Central Breaker,' 70.

84. The description of the processing stages and mechanical devices used in the breaker should be read in conjunction with an examination of the schematic illustrations drawn for the HAER-PA-204, Huber Coal Breaker Project during the summer of 1991 and the Glen Alden Coal Company Mechanical Engineers, Huber Breaker Diagrammatic Flow Sheets: Plans, Sections, and Equipment Locations, 1939, pages 1-9, included in this report as Appendix.

85. Hudson Coal Company, Story of Anthracite, 380-383.

86. Decker and Hoffman, Coal Preparation, 185; "Preparation," Coal Age 41, 427.

87. Decker and Hoffman, Coal Preparation, 184; International Library of Technology, Surface Arrangements, 74.51-74.63; Jones, "Huber Breaker and Heavy Machinery," 8 mm film; Drawing, J550, 10-437, G.A.C.C.; Drawing, J552, 10-20-37, G.A.C.C.; Drawing J554, 10-30-37, G.A.C.C.; Drawing J521, 8-3-37, G.A.C.C.; Drawing J590, 5-28-38, G.A.C.C.; Drawing, J559, 7-16-38, G.A.C.C.; Drawing, J592, 5-28-38, G.A.C.C. See also Index to Photographs for Huber Coal Breaker, Breaker (HAER No. PA-204-A), Photograph Nos. PA-204-A-5, 6, 13, 15, 24, 42, and 50.

88. Drawing, L1692, 12-8-37, G.A.C.C.

89. Jones, "Huber Breaker and Heavy Machinery," 8 mm film; Drawing J552, 10-20-37, G.A.C.C. See Index to Photographs for this report (HAER No. PA-204), Photograph No. PA-204-60. See also Index to Photographs for Huber Coal Breaker, Breaker (HAER No. PA-204-A), Photograph Nos. PA-204-A-12 through 15, and 20.

90. International Library of Technology, Surface Arrangements, 74.66-74.76; Wilmot Engineering Company, Wilmot Coal Breaking and Crushing Equipment(Hazleton, Pa: Wilmot Engineering Co., no date), 2-8; Drawing J522, 8-3-37, G.A.C.C.; Drawing, J552, 10-20-37, G.A.C.C.; Drawing, J554, 10-30-37, G.A.C.C.; Drawing, J567, 2-10-38/3-7-39, G.A.C.C.; Drawing 20053, 10-8-12, G.A.C.C.; Drawing, 20054, 10-15-12, G.A.C.C. See Index to Photographs for Huber Coal Breaker, Breaker (HAER No. PA-204-A), Photograph Nos. PA-204-A-17 through 19.

91. Drawing, R1000, 12-20-57, G.A.C.C.; See also Measured Drawings for this report (Huber Coal Breaker, HAER No. PA-204), "Mine-Run Process", Drawing No. 4 of 7.

92. Cashaunas, "Breaker Walkthrough," interview by HAER Team, Tape Recording, 7 June, 1991. See also Index to Photographs for this report (Huber Coal Breaker, HAER No. PA-204), Photograph Nos. PA-204-59 and 60.

93. Drawing, R1000, 12-20-57, G.A.C.C.; See also Measured Drawings for this report (Huber Coal Breaker (HAER No. PA-204), "Coarse-Coal Process," Drawing No. 6 of 7.

94. A representative sample of the literature on coal cleaning equipment history and technology includes: Wallace, St. Clair, 1987; Hudson Coal Company, The Story of Anthracite, 1932; Chance, Report on Ming Methods, 1883; International Library of Technology, Surface Arrangements, 1907; Decker and Hoffman, Coal Preparation, 1963; "Preparation," Coal Age 41, (October, 1936); C. Robinson and L.R. Smith, "Modern Trends in Coal Preparation," The Mining Congress Journal 38, (February, 1952); "Modern Coal Preparation," Coal Age, (April, 1944); D.R. Mitchell, "Modern Anthracite Preparation," Mechanization 4, (August, 1940); J.B. Morrow, "American Coal Preparation Practice," Mining Congress Journal 22, (October, 1936);McGraw-Hill Publishing Company, The Mining Catalogs, 1947/1948(New York: McGraw-Hill Publishing Company, 1948); The Dorr Company, The Dorr Type H Classifier, Bulletin No. 2281 (New York: The Dorr Company, 1949); Western Machine Company, Wemco S-H Classifier: A Progressive Design for Better Metallurgy, Bulletin No. c-1-s-1 (San Francisco: Western Machinery Company, no date); Wilmot Engineering Company, Wilmot Automatic Coal Preparation Equipment, Bulletin CC-571 (White Haven, Pa: Wilmot Engineering Company, no date); Wilmot Engineering Company, Dyna Whirlpool Process: New Coal Cleaning Method, Bulletin DWP 10M-11-62 (White Haven, Pa: Wilmot Engineering Company, no date).

95. Decker and Hoffman, Coal Preparation, 87, 213.

96. "Anthracite Companies Explore All Roads to Cost Reduction," Coal Age 40, (February 1935): 59; For another detailed technical description, see: Decker and Hoffman, Coal Preparation, 213-220; For mechanical engineering details, see: Drawing, J417, 9-14-35, G.A.C.C.; Drawing J429, 9-19-35, G.A.C.C.; Drawing, J543, 7-7-37, G.A.C.C.; Drawing, J546, 8-24-37, G.A.C.C.; Drawing, J547, 9-7-37, G.A.C.C.; Drawing, J566, 12-28-37, G.A.C.C.; Drawing, J585, 3-28-38, G.A.C.C.; Drawing, J586, 4-4-38, G.A.C.C.; Drawing, J589, 8-6-38, G.A.C.C.; Drawing, J669, 7-19-39, G.A.C.C.; Drawing, L1692, 12-8-37, G.A.C.C.

97. See Attachment No. 4, pages 4-5; Hall, "Huber Central Breaker," 70; "Anthracite Companies Explore," Coal Age 40, 59.

98. R.L. Polk and Company, Polk's Scranton City Directory, 1908; Morrow, "Coal Preparation," 44.

99. Hall, "Huber Central Breaker," 68; "Anthracite Breaker with Fresh-Water Cone and Large Pockets for Retail Trade," Coal Age 41, (March 1936): 97; R.L. Polk and Company, Polk's Scranton City Directory, 1934; "Preparation," Coal Age 41, 432.

100. R.L. Polk and Company, Polk's Scranton City Directory, 1940-1959; "Finch Manufacturing Company,"Scranton Industry File," Lackawanna Historical Society, Scranton, Pennsylvania.

101. See Measured Drawings for this report (Huber Coal Breaker, HAER No. PA-204), "Fine-Coal Process 1939", Drawing No. 5 of 7; Appendix; Drawing, J517, 8-23-38, G.A.C.C.; Drawing, J536, 1-21-38, G.A.C.C.; Drawing, R1000, 12-20-57, G.A.C.C.; Drawing, R1287, 8-8-63, G.A.C.C.; Drawing, J518, 8-12-38, G.A.C.C.; Drawing, J535, 1-31-38, G.A.C.C.; Drawing, J583, 4-15-38, G.A.C.C.; Drawing, J548, 9-10-37, G.A.C.C.; Drawing, J582, 3-29-38, G.A.C.C.; See Index to Photographs for Huber Coal Breaker, Breaker (HAER No. PA-204-A), Photograph Nos. PA-204-A-33, 34, 44, 47-50.

102. Drawing, J590, 5-28-38, G.A.C.C.; See also Index to Photographs for Huber Coal Breaker, Breaker (HAER No. PA-204-A), Photograph Nos. PA-204-A-38 through 41.

103. Attachment No. 4; Drawing, R1000, 12-20-57, G.A.C.C.; See Index to Photographs for Huber Coal Breaker, Breaker (HAER No. PA-204-A), Photograph Nos. PA-204-A-38 through 41.

104. Hall, "Huber Central Breaker," 68; The Mining and Preparation of Blue Coal, 16mm, 12 min,(ca. 1940's), distributed by The Delaware, Lackawanna, and Western Coal Company.

105. Hall, "Huber Central Breaker," 68.

106. Glen Alden Fuel Sales, Inc., "Why is 'blue coal' Blue?' (sales brochure), Form F147, no date. (author's personal collection)

107. Drawing, R694, 3-3-39, G.A.C.C.; See also Index to Photographs for this report (Huber Coal Breaker, HAER No. PA-204), Photograph Nos. PA-204-36, 37, and 43.

108. Hall, "First Aerial Disposal Plant," 32,34.

109. Hall, "First Aerial Disposal Plant," 33; William W. Everett, "The Huber Breaker Refuse Bank," (Consulting Engineer Report, July 9, 1962), William Everett, Jr. Private Collection, Wilkes-Barre, Pa., 1, 2; Drawing, R658, 2-24-38, G.A.C.C.

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111. Ibid.

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113. Everett, "The Huber Refuse Bank," 3-11; "Silver Dollars and Glen Alden: Building Better Community Relations for Community and Benefits," Coal Age, (March 1963): 80. See also Index to Photographs for this report (Huber Coal Breaker, HAER No. PA-204), Photograph Nos. PA-204-47 and 48.

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122. Paul Weir Company, "Report on Operations," 7.

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124. "New Glen Alden Head to Move Here Tomorrow," Sunday Independent, 2 March, 1953, found in the Glen Alden Coal Company Newspaper File, Wyoming Historical and Geological Society, Wilkes-Barre, Pa.

125. "Case Discusses Anthracite Problems," The Black Diamond, 16 May, 1953, 28, found in the Glen Alden Coal Company Newspaper File, Wyoming Historical and Geological Society, Wilkes-Barre, Pa.

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127. "Greater Coal Production by Mechanization Probed as Way to Cut Anthracite Price," Wilkes-Barre Record, 2 June, 1953; "Glen Alden Reports $1,452,000 Loss in First Half of 1953," The Scranton Tribune, 10 August, 1953; "Glen Alden Prepares to Sell More Small Sizes; Loss is $1,452,000," Wilkes-Barre Record, 10 August, 1953; Call Glen Alden Report for 1952 'Promising'," Sunday Independent, 7 March, 1954; "Glen Alden Reports Operating Loss of $4,934,000 for 1953," Wilkes-Barre Record, 24 March, 1954; "$3 Million to be Spent by Glen

Alden in Next 2 Years for Modernization," Wilkes-Barre Record, 19 February, 1955, found in the Glen Alden Coal Company Newspaper File, Wyoming Historical and Geological Society, Wilkes-Barre, Pa.

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132. "Glen Alden Coal Reported To Have Acquired Firm In Its Plan To Diversify," Wilkes-Barre Record, 26 April, 1955, found in the Glen Alden Coal Company Newspaper File, Wyoming Historical and Geological Society, Wilkes-Barre, Pa.

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137. "Glen Alden Tools Up," Coal Age, 82; Cashaunas, "Breaker Walkthrough," interview by HAER Team, tape recording, 7 June, 1991.

138. "Glen Alden Tools Up," Coal Age, 83-84; Wilmot Engineering Company, Dyna Whirlpool Process: New Coal Cleaning Method, Bulletin DWP 1M-11-62 (White Haven, Pa: Wilmot Engineering Company, no date); Drawing, R1287, 8-8-63, G.A.C.C.

139. "Glen Alden Tools Up," Coal Age, 82, 84.

140. Cashaunas, "Breaker Walkthrough," interview by HAER Team, tape recording, 7 June, 1991.

141. United States v. Tabor Court Realty Corp., et al., 803 F. 2d 1288 (3d. Cir. 1986): 1291.

142. Ibid., 1292-1293.

143. Ibid., 1294; United States v. Gleneagles Investment Co., Inc., 571 F. Supp. 935 (M.D. Pa. 1983) (Gleneagles II), 938-941.

144. Gleneagles II, 940; "Blue Coal Corporation Map Showing Parcel 1284, Huber Colliery," 6-18-75, Blue Coal Archives, Blue Coal Office, Ashley, Pa., photocopied by HAER.